AlliedSignal Inc.

Morristown, NJ

ENSR

Supplemental Investigation Summary Report

UOP Site
East Rutherford, NJ

Revision 1

ENSR Consulting and Engineering

February 1994

Document Number 0186-002-526

ENSR Consulting
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February 23, 1994

Ms. Gwen Barunas, Case Manager
Bureau of Federal Case Management
New Jersey Department of Environmental
Protection & Energy
Division of Responsible Party Site Remediation
CN 028
Trenton, NJ 08625-0028

Re: UOP Superfund Site
East Rutherford, Bergan County

Dear Ms. Barunas:

On behalf of AlliedSignal, Inc., ENSR is pleased to submit four (4) copies of the revisions to the Supplemental Investigation Summary Report. Attachment 1 is an instruction sheet for inserting/exchanging the revised pages in the Supplemental Investigation Summary Report. Attachment 2 includes the Binder Replacement Covers, and Attachment 3 includes the revised text. Atachment 4 includes a copy of the response to NJDEPE comments dated December 30, 1993.

If you have any questions, please feel free to contact Mark Kamilow at AlliedSignal (201-455-2119).

Sincerely,

Frank Lilley

Frank Lilley
Project Manager

cc:
Mark Kamilow, AlliedSignal Inc.
Richard Puvogel, EPA (2 copies)
Michael Worthy, ENSR

Attachment 1

Instruction Sheet

AlliedSignal UOP Site
Instruction Sheet for Inserting/Exchanging
In
Supplemental Investigation Summary Report
February 23, 1994

Binder Cover

1. Attachment 2 contains replacement covers for both the front and spine of the binder.
2. In the event the cover is stuck, slide a thin ruler in back of the existing cover and then pull the page out.
3. Slide the revised cover and spine covers in the binder.

Table of Contents

1. Replace pages i thru iv (dated October 1993) with the revised Table of Contents. The revised Table of Contents is provided in Attachment 3-A.
2. The date (February 1994) the document was prepared is located in the lower left hand corner of each page, and therefore, the switch can easily be double checked.

Section 3

1. Replace the existing Section 3 (pages 3-1 thru 3-23) with the revised Section 3 (pages 3-1 thru 3-24). The revised Section 3.0 is provided in Attachment 3-B.
2. The date (February 1994) the document was prepared is located in the lower left hand corner of each page, and therefore, the switch can easily be double checked.

Section 4

1. Replace the existing Figure 4-2B on page 4-7 of the document with the revised Figure 4-2B. The revised Figure 4-2B is provided in Attachment 3-C.
2. Replace the existing Figure 4-4 on page 4-10 of the document with the revised Figure 4-4. The revised Figure 4-2B is provided in Attachment 3-C.
3. The date (2/94) the revised figures were prepared is located in the center box in the lower left hand corner of each figure, and therefore, the switch can easily be double checked.

Section 5

1. Replace existing pages 5-3 and 5-4 with the revised pages 5-3 and 5-4 of the document. The revised pages are provided in Attachment 3-D.
2. The date (February 1994) the document was prepared is located in the lower left hand corner of each page, and therefore, the switch can easily be double checked.

Attachment 2

Binder Replacement Covers

AlliedSignal Inc.

Morristown, NJ

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AlliedSignal Inc.

Morristown, NJ

Supplemental Investigation Summary Report

UOP Site
East Rutherford, NJ

ENSR Consulting and Engineering

October 1993

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(Cont'd)

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1.0 INTRODUCTION

This report describes the activities and results of the supplemental investigations in Areas 1, 1A, 2 and 5 at the UOP site in East Rutherford, New Jersey, as shown on Figure 1-1. The work was conducted at various times from November 13, 1992 through February 5, 1993, in accordance with the Supplemental Investigations Work Plan dated September, 1992 and the NJDEPE comment letter to the Work Plan received by AlliedSignal on October 23, 1992. The primary purpose of this investigation was to complete the delineation of shallow soil and surficial aquifer contamination in preparation for remedial activities. The shallow soils consist of fill material, natural soils, and naturally occurring meadow mat, which overly a thick layer of varved clay. This shallow layer is no more than ten feet thick. The surficial aquifer is also confined to the unit above the clay. Another objective was to test the accuracy of field screening techniques for analyzing polychlorinated biphenyls (PCBs), carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and volatile organic compounds (VOCs).

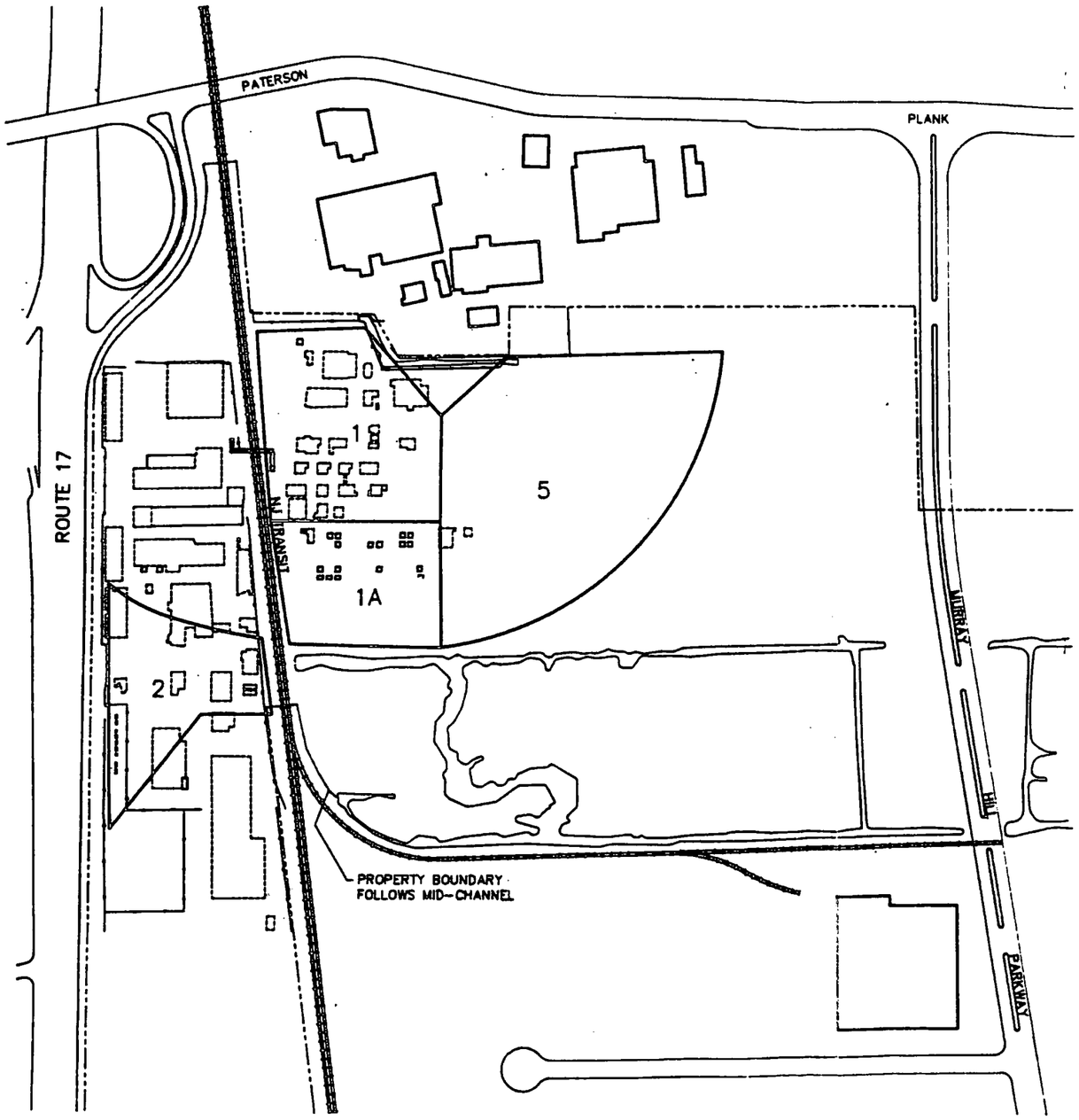
1.1 Effect of Record of Decision

The structure of this investigation was based on the results of the Feasibility Study (FS) submitted to DEPE in June 1992. Realizing that public and EPA comments on the proposed plan could affect the remedy described in the FS, the submittal of this investigation report was postponed until after the Record of Decision (ROD) was issued.

The ROD contains two significant changes from the FS. One change is that the selected remedy for VOC-contaminated soil is thermal desorption rather than ex-situ vapor extraction as recommended by the FS. This change does not affect the supplemental investigation. The other change is that the proposed cleanup standards for cPAHs have changed to reflect revised cleanup standards published by the DEPE. This change potentially affects the areas and volumes requiring remediation. The change in clean up standards is described in Section 1.2.

1.2 Revised Cleanup Standards

On February 3, 1992, the DEPE published a proposed rule entitled: "Cleanup Standards at Contaminated Sites," NJAC 7:26D. At DEPE's direction, the non-residential direct contact soil cleanup criteria contained in the proposed rule were used as the action limits in the FS. Based on the large magnitude of comments received, the DEPE did not adopt the proposed rule. However, the Department did publish a revised set of criteria to correct errors identified by the commentors. This revised list is included herein as Appendix E.



N

0 300 600

SCALE IN FEET

FIGURE 1-1

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SITE AREAS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
KLU	3/90	0186-002-284

018622

The revised standards affect the cPAH action levels used in the FS. Table 1-1 shows the originally proposed and the revised criteria for these compounds. As shown in the table, criteria for most of the compounds have been increased from 2.5 to 4 mg/kg.

In addition to increasing the criteria for many cPAHs, one compound, Benzo(ghi)perelylene has been removed completely as a cPAH of concern. This compound was not present in the original Feasibility Study (FS), but was added to FS Revision 2 at NJDEPE direction. With DEPE's concurrence, the revised standards are used in this document to define remediation areas.

1.3 Report Structure

The remainder of this report describes the activities conducted at the site, the results of the analytical data and estimated quantities of contaminated materials. Section 2 discusses the field sampling activities including the surveying conducted at the site. Section 3 discusses the results of laboratory analyses and of field and laboratory screening analyses. Section 4 presents the estimated quantities that require remediation and how they compare to what was identified in the feasibility study (ENSR, 1992). Section 5 discusses conclusions and recommendations regarding the results of the supplemental investigation.

TABLE 1-1

cPAH Soil Cleanup Criteria
Non-Residential, Direct Contact

Compound	Proposed* Criterion, February 3, 1992	Revised Criterion January 19, 1993
Benzo(b)fluoranthrene	2.5	4
Benzo(a)anthracene	2.5	4
Benzo(a)pyrene	0.66	0.66
Benzo(k)fluoranthrene	2.5	4
Benzo(ghi)perylene	2.5	W**
Chyrsene	2.5	40
Dibenzo(a,h)anthracene	0.66	0.66
Indeno(1,2,3-cd)pyrene	2.5	4

*These criteria are presently used in the UOP site FS
**Withdrawn; compound has no published slope factor or RFD.

2.0 FIELD SAMPLING ACTIVITIES

2.1 Locating Soil Boring Sampling Points

ENSR initiated field activities on November 13, 1993 with marking soil boring and groundwater sampling locations. The sampling locations were identified by placing a wooden stake marked with the sample identification number into the ground. The location of the points were determined based upon measuring distances off of known reference points such as monitoring wells, former building foundations and fence lines. Due to the dense growth of vegetation, two days were required to complete the staking activities. The following sections describe the sampling activities and locations for each of the subject contaminants: lead, polychlorinated biphenyls (PCBs), carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and volatile organic compounds (VOCs). Soil boring logs for these samples are in Appendix A.

2.2 Lead Soil Sampling

As discussed in the Supplemental Investigation Work Plan, the remediation approach recommended consists of covering surficial soils containing lead in excess of 600 mg/kg. Using this limit, sections in Areas 1, 1A and 5 were identified in the Feasibility Study (FS) for soil remediation. Samples were collected from these areas to delineate the areal limits of soil requiring lead remediation.

Twenty-two surficial soil samples were collected at the site on November 18 and 19, 1992. Samples were collected using decontaminated stainless steel hand augers. Most of the samples were composited from a depth of 0 to 2 feet below ground surface. However, due to fill material consisting of brick, glass, plastic and metal fragments and large cobbles encountered in some of the borings, some samples could only be composited from a depth of 0 to 1.5 feet below ground surface. Groundwater was usually encountered in the borings at depths ranging from 6 to 20 inches below ground surface. Samples collected from each hand auger boring were mixed in decontaminated stainless steel bowls and placed in laboratory supplied containers. The samples were analyzed for total lead using EPA Method 6010 as outlined in EPA SW 846 analytical protocols. Two samples (LX-3, LX-8) were broken during transit to the laboratory and were re-sampled on November 30, 1992.

2.3 PCB and cPAH Soil Sampling

As discussed in the Supplemental Investigation Work Plan, the remediation approach recommended consists of excavation and treatment of soils contaminated with PCBs in excess of 25 mg/kg and total cPAHs in excess of 29 mg/kg. The cPAHs of concern are Benzo(b)fluoranthene; Benzo(a)anthracene; Benzo(a)pyrene; Benzo(k)fluoranthene; Chrysene; Dibenzo(a,h)anthracene; Indeno(1,2,3-cd)pyrene. Using the limits previously identified, sections in Areas 1, 2 and 5 were identified for soil remediation. Samples were collected from Area 2 to assist in delineation of soils contaminated with PCBs. Samples were collected from Areas 1 and 5 to assist in delineation of soils contaminated with both PCB and cPAH compounds.

Thirty-five PCB and twenty-nine cPAH samples were collected from the site between November 20 and November 30, 1992. As with the lead samples, samples were collected using decontaminated stainless steel hand augers. Most of the samples were composited from a depth of 0 to 2 feet below ground surface. However, due to fill material and large cobbles encountered in some of the borings, some samples could only be composited from a depth of 0 to 1.5 feet below ground surface. In addition, two samples (S-4B and S-5B) were collected from soils at a depth greater than 2 feet below ground surface. Groundwater was usually encountered in the borings at depths ranging from 6 to 20 inches below ground surface. Samples collected from each hand auger boring were mixed in decontaminated stainless steel bowls and placed in laboratory supplied containers. The samples were analyzed for PCBs using EPA Method 8080 and for cPAHs using EPA Method 8270, as outlined in EPA SW 846 analytical protocols. One sample (P/P-7) was broken during transit to the laboratory and was re-sampled on November 30, 1992.

Analytical screening methods for PCB and PAH compounds were also conducted on randomly selected samples. Ten samples for PCB analyses were selected and were screened using the EnSys "PCB RISc Test". As discussed in the Supplemental Investigation Work Plan, the "RISc" test employs a semi-quantitative colormetric method incorporating immunoassay technology. Prepared standards and reagents were combined with the sample inside coated test tubes. The color intensity formed within the test tube is inversely proportional to the concentration of PCBs within the sample (greater color, less PCBs; less color, greater PCBs). The results of the test are measured on a portable photometer by comparison to a standard. In this case, standards of 2 and 25 ppm were used.

The Selected Ion Method was chosen as a laboratory screening method of cPAH compounds. This method is analyzed using a GC/MS and is designed to provide rapid analytical results with low detection limits. Ten samples were originally scheduled to be chosen at random by the laboratory for analysis by this screening procedure. The laboratory mistakenly performed the

screening procedure on all the samples collected for Method 8270 analysis. All these results are presented in Section 3, herein.

2.4 VOC Soil Sampling

As discussed in the Supplemental Investigation Work Plan the remediation approach consists of excavating and treating soils with VOC contamination in excess of 1000 mg/kg. Using this criterion, Areas 1A and 2 were identified as exceeding acceptable threshold concentrations for VOC in soils.

Nine soil samples were collected from the site on November 17, 1992. Samples were collected from soil borings advanced with a truck mounted drill rig utilizing a hollow stem auger and a 2 foot long, 3 inch diameter stainless steel split barrel sampler. Continuous split barrel samples were obtained from ground surface to the bottom of meadow mat deposits, which were encountered at a depth ranging between 6 to 10 feet below ground surface.

Each split barrel sample was placed in two samples containers; one for field screening analysis and one for laboratory analysis. As the soil was placed in the containers, it was screened for the presence of volatile organics using ambient temperature head space analysis with an HNu photoionization detector or a portable OVA flame ionization detector. The sample containing the highest VOC concentration, based upon the results of the head space analysis or visual evidence of contamination was submitted for laboratory and field screening analysis. The purpose of analyzing the samples using both methodologies is to assist in determining the applicability of using GC head space screening techniques during remediation.

The field screening analysis consisted of headspace extraction and analysis on a Photovac portable gas chromatograph (GC). The field screening samples were analyzed for:

- Benzene
- Toluene
- Ethylbenzene
- Total Xylene
- Trichloroethylene
- Tetrachloroethylene

The duplicate samples were analyzed by the laboratory for VOCs using EPA Method 8240 as specified in EPA SW 846 analytical protocol.

2.5 Installation of Monitoring Wells

Seven PVC monitoring wells were installed as identified in the Supplemental Investigation Work Plan. The wells were used to collect groundwater samples for VOC and Base Neutral and Acid Extractable Organic compounds (B/N/As) analyses. Monitoring wells were installed in Areas 1, 1A and 2. Some monitoring wells were moved small distances from the locations shown in the work plan because fill material was encountered during drilling which would not allow the auger to extend to the depth desired. The monitoring wells were installed to a depth between 6 and 8 feet below grade. This was approximately the depth to the bottom of the meadow mat.

The wells were installed by Environmental Drilling (EDI) of West Creek, New Jersey, a New Jersey licensed well driller. Upon completion, the well elevations were surveyed to the nearest hundredth of a foot by The Faraldi Group of Secaucus, New Jersey, a New Jersey certified land surveyor.

The borings for the monitoring wells were advanced by a truck-mounted drill rig with 8-inch I.D. hollow-stem augers. Four-inch diameter schedule 40 PVC riser pipe and 10 slot well screen were utilized during the construction of the well as recommended by the NJDEPE. In addition, because of the shallow groundwater table, the NJDEPE recommended that the protective outer casing had to be shortened so that it would not intersect the groundwater table. This protective casing extends approximately 2.5 feet above grade. All the wells are supplied with a keyed alike lock. All drill cuttings were raked into the soil surrounding the monitoring well.

Upon completion of the installation, the monitoring wells were developed utilizing both a surge block and an inertial pump. The inertial pump consists of a single tube with a foot check valve at one end. When the tube is lifted up and down in short, swift strokes, water inside the well moves up the tube as a result of its inertia. The check valve allows water to enter the tube but doesn't allow it to drain out of the pipe. In some cases, deionized water was added to the wells as recommended by Mr. Greg Giles of the NJDEPE in order to assist in the development process. Mr. Giles recommended this procedure during his visit to the site on November 19, 1992. The evacuated groundwater was discharged to the ground surface at a minimum distance of 10 feet from the well. The monitoring well was then allowed to stabilize for a two-week period prior to sampling. Monitoring well logs and As-Built Certifications, "Form A" are in Appendix B, herein.

2.6 Groundwater Sampling

Groundwater samples were collected from the seven monitoring wells on December 10, 1992. Static water level measurements were obtained prior to sampling to determine the depth of the water table. The wells were originally to be purged 3 times their volume to remove standing

water. However, only one or two volumes were purged from some of the wells due to their slow recharge. Environmental samples were collected using decontaminated teflon coated bailers. Groundwater samples were analyzed for VOC compounds per EPA Method 8240 and for priority pollutant semivolatile organic base neutral and acid extractable compounds (B/N/A) per EPA Method 8270. Field measurements were also obtained for temperature, conductivity and corrosivity (pH), dissolved oxygen (DO) and oxidation-reduction potential (Eh). The Eh meter malfunctioned during the sampling activities, thus oxidation-reduction measurements were not obtained.

In addition to laboratory analyses and field measurements, duplicate samples were screened for total VOCs in groundwater using a Photovac portable gas chromatograph (GC). The purpose of analyzing the samples using both methodologies is to determine the reliability of using this GC head space screening technique during the remediation of contaminated groundwater. The field screening samples were analyzed for:

- Benzene
- Toluene
- Ethylbenzene
- Total Xylene
- Trichloroethylene
- Tetrachloroethylene

2.7 Surveying

The Albert Faraldi Group of Secaucus, a New Jersey certified land surveyor, was utilized to re-survey the site. As presented in the Supplemental Investigation Work Plan, the purpose of re-surveying was to:

- Accurately locate the positions of former and proposed soil borings and monitoring wells at the site.
- Verify the horizontal accuracy of the existing topographic map originally produced for Geraghty and Miller.
- Produce a new map of the site based upon the original map if accurate.
- Survey previous monitoring wells installed at the site and survey those proposed in this sampling plan.

- Survey the positions of previous soil borings by locating any former surveying stakes which still may exist. If such stakes cannot be located, previous field notes will be used to locate the approximate positions of former soil borings. Soil borings proposed in this sampling plan will also be surveyed.

- Survey the location and size of the most prominent on-site/building foundations, as they may be used during future remedial activities.

- Produce a new map of the site containing the location of the monitoring wells, soil borings and test pits.

Surveying was initiated on December 14, 1992 and was completed on February 5, 1992. During this time, flood waters resulting from the December 1992 northeaster storm and several other heavy rain falls covered the majority of the UOP site and hindered the surveying activities. In addition, previous soil boring locations at the site could not be found and thus could not be plotted onto the site drawing.

The location of landmarks, monitoring wells, and soil borings were plotted on a drawing based upon the northing and easting positions as identified by the New Jersey Coordinate System. This drawing is included in a map pocket at the end of this report. The surveyor also recorded the ground-surface elevations of soil boring locations and the ground-surface, outer casing and inner casing elevations of monitoring wells. These measurements are summarized in Appendix C, herein. The location certifications, "Form B", are also in Appendix C.

The surveyor installed four concrete monuments identified as "UOP No.1" through "UOP No.4", which will be used to accurately locate the limits of future remediation activities or any additional wells and/or borings at the site. The monument locations are shown on the surveyor's map in the map pocket.

3.0 ANALYTICAL RESULTS

The following sections present the results of lead, PCB, cPAH, VOC and BNA analyses by standard laboratory and screening methods. These results and interpretations made from them are based on certain assumptions regarding the quality of the data. A review of the data quality is included as Appendix D, herein.

3.1 Lead Soil Samples

Table 3-1 and Figure 3-1 summarize the results of the laboratory analysis of the samples.

The concentration of lead in the samples ranged from 14 to 12,000 mg/kg. Twelve of the twenty-two samples collected and analyzed contained concentration of total lead greater than 600 mg/kg. The location of these elevated concentrations are located predominantly to the north and east of Area 5. These data show that the horizontal extent of lead contamination at the site is greater than anticipated.

3.2 PCB Soil Samples

3.2.1 Laboratory Results

Table 3-2 and Figure 3-2 summarize the results of the laboratory analysis of the samples.

The results of the 35 soil samples reveal 25 samples with concentrations of PCBs greater than 2 mg/kg. Of these 25 samples, 5 contain concentrations greater than 25 mg/kg. The concentration of these five samples ranged from 180 mg/kg (S-5B) to 400 mg/kg (P/P-6). The samples that contain the elevated concentrations of PCBs (greater than 2 mg/kg) are scattered throughout the site. They are generally located in Area 2, in the northwestern section of Area 5, and southeast of Area 5. The laboratory results show that the only detected PCB Aroclor is Aroclor 1248. This finding is consistent with previous investigations.

3.2.2 Screening Results

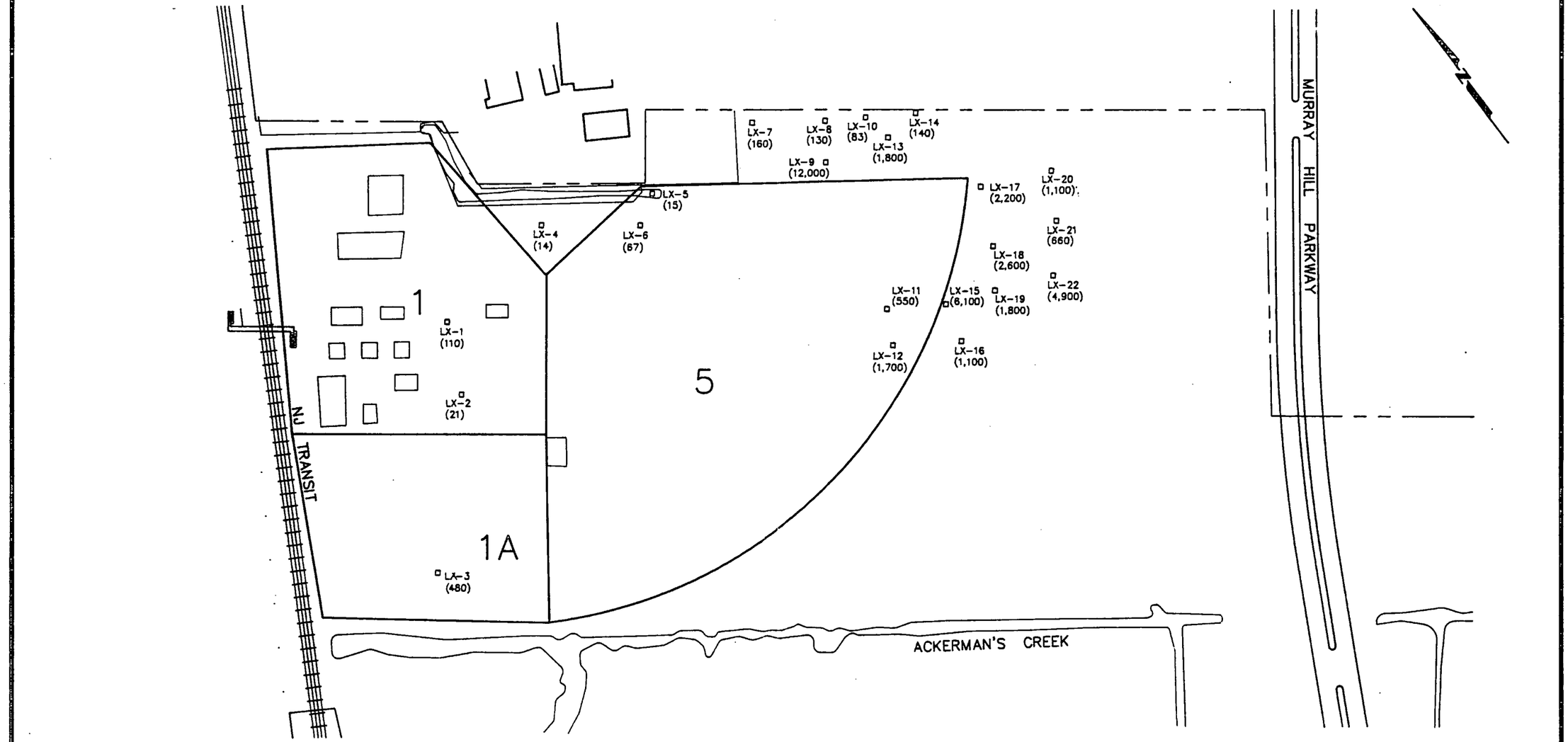
The first two columns of Table 3-3 summarize the results of the field screening analysis of the samples.

TABLE 3-1

Summary of Lead in Soils
Samples Collected November, 1992
UOP Site, East Rutherford, NJ

Sample Location	Lead Concentration, mg/kg, dry weight
LX1	110
LX2	21
LX3*	480
LX30	730
LX4	14
LX5	15
LX6	67
LX7	160
LX8	130
LX31*	180
LX9	12,000
LX10	83
LX11	550
LX12	1700
LX13	1800
LX14	140
LX15	6100
LX16	1100
LX17	2200
LX18	2600
LX19	1800
LX20	1100
LX21	660
LX22	4900

NOTE - All samples are 0-2 ft. composites
*Blind duplicate of sample listed directly above.



LEGEND

▫ SURVEYED LOCATION OF LEAD SOIL SAMPLES

( ) CONCENTRATION IN mg/kg

0 150 300

SCALE IN FEET
1" = 150'

FIGURE 3-1

ENSR CONSULTING & ENGINEERING

LEAD SOIL SAMPLE LOCATIONS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	3/93	0186-002-525

01866113B

TABLE 3-2

Summary of PCBs in Soils - Laboratory Results
Samples Collected November 1992
UOP Site, East Rutherford, NJ

Sample Location	PCB* Concentration, mg/kg, dry wt.	Sample Location	PCB* Concentration, mg/kg, dry wt.
S-4A	<0.2	P/P-17	11
P/P-41**	<0.8	P/P-18	230
S-4B (2-5')	0.3	P/P-19	12
S-5A	300	P/P-20	1.5
S-5B(2-3')	180	P/P-21	<0.04
P/P-1	1.6	P/P-22	7.0
P/P-2	7.7	P/P-23	<3.4
P/P-3	7.5	P/P-24	<1.7
P/P-39**	9.1	P/P-25	4.7
P/P-4	24	P/P-26	0.6
P/P-5	24	P/P-27	11
P/P-6	400	P/P-28	4.2
P/P-7	1.9	P/P-29	11
P/P-8	14	P/P-30	7.2
P/P-9	4.1	P/P-31	14
P/P-10	4.8		
P/P-11	<0.3		
P/P-12	<1.4		
P/P-13	2.2		
P/P-14	290		
P/P-15	<0.1		
P/P-16	<0.6		

NOTE - All samples are 0-2 ft. composites, except as noted.
*Total PCB concentration is comprised solely of Aroclor 1248. No other Aroclors were detected.
**Blind Duplicate of sample listed directly above.
< - Analyte was not detected above the listed detection limit.

TABLE 3-2

Summary of PCBs in Soils - Laboratory Results
Samples Collected November 1992
UOP Site, East Rutherford, NJ

Sample Location	PCB* Concentration, mg/kg, dry wt.	Sample Location	PCB* Concentration, mg/kg, dry wt.
S-4A	<0.2	P/P-17	11
P/P-41**	<0.8	P/P-18	230
S-4B (2-5')	0.3	P/P-19	12
S-5A	300	P/P-20	1.5
S-5B(2-3')	180	P/P-21	<0.04
P/P-1	1.6	P/P-22	7.0
P/P-2	7.7	P/P-23	<3.4
P/P-3	7.5	P/P-24	<1.7
P/P-39**	9.1	P/P-25	4.7
P/P-4	24	P/P-26	0.6
P/P-5	24	P/P-27	11
P/P-6	400	P/P-28	4.2
P/P-7	1.9	P/P-29	11
P/P-8	14	P/P-30	7.2
P/P-9	4.1	P/P-31	14
P/P-10	4.8		
P/P-11	<0.3		
P/P-12	<1.4		
P/P-13	2.2		
P/P-14	290		
P/P-15	<0.1		
P/P-16	<0.6		

NOTE - All samples are 0-2 ft. composites, except as noted.
*Total PCB concentration is comprised solely of Aroclor 1248. No other Aroclors were detected.
**Blind Duplicate of sample listed directly above.
< - Analyte was not detected above the listed detection limit.

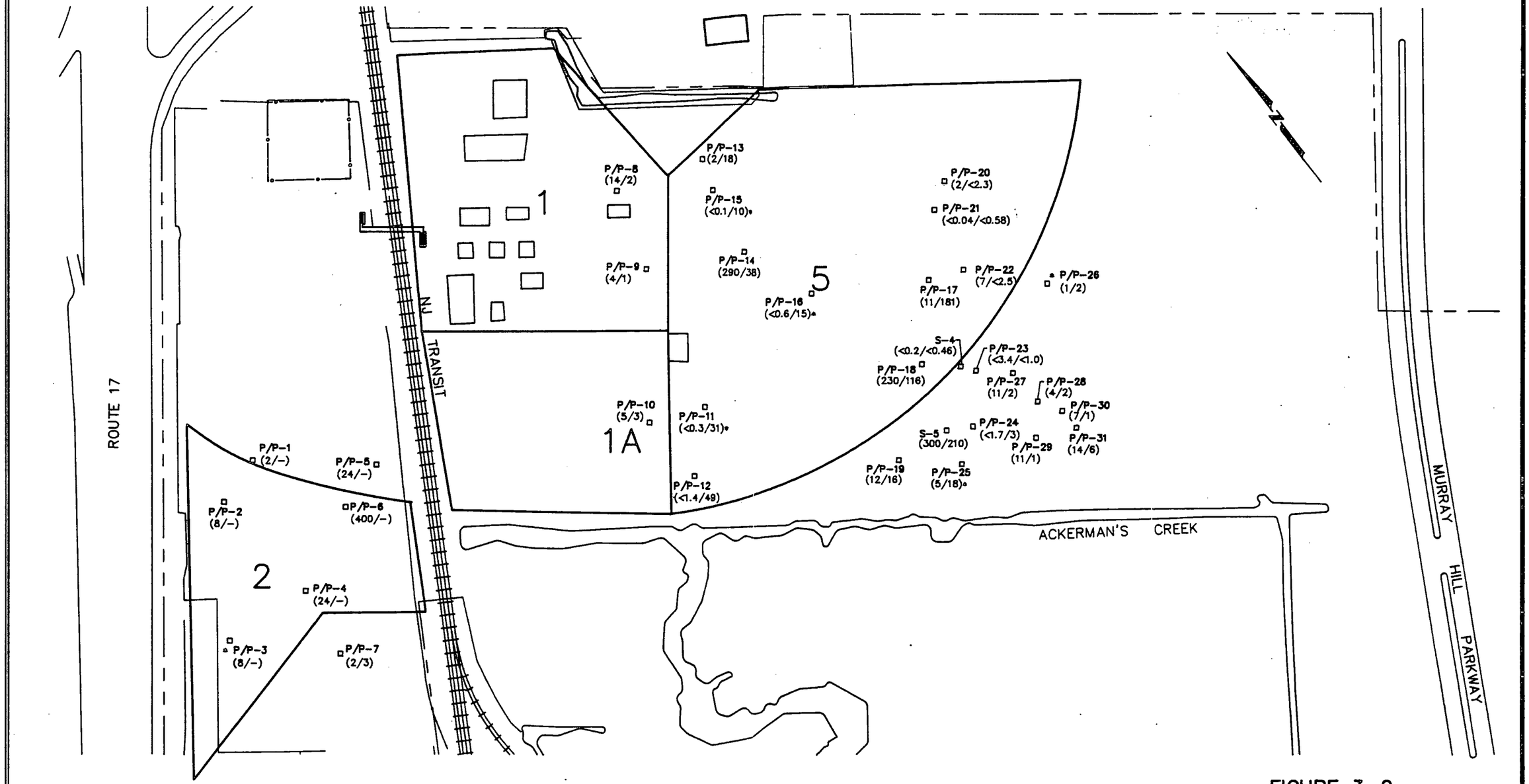


FIGURE 3-2

LEGEND

□ SURVEYED LOCATION OF PCB/PAH SOIL SAMPLES

( )* CONCENTRATION EXCEEDS ACTION LEVEL FOR INDIVIDUAL CPAH's

NOTE
* NOT FOUND IN FIELD; LOCATION PLOTTED FROM ENSR MAP

ENSR CONSULTING & ENGINEERING

PCB/PAH SOIL SAMPLE LOCATIONS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	3/93	0186-002-525

01861148

TABLE 3-3

PCBs In Soils Results Comparison
Laboratory vs. Field Screening
Samples Collected November, 1992
UOP Site, East Rutherford, NJ

Sample Location	PCB Concentration*, mg/kg	
	Field Reading	Laboratory Results
S-4A (2-5')	= 2	< 0.2
S-4B	x<2	0.3
S-5A	x>25	300
S-5B (2-3')	x>25	180
P/P-3	2<x<25	24
P/P-4	2<x<25	24
P/P-11	x<2	<0.3
P/P-22	2<x<25	7.0
P/P-30	2<x<25	7.2
P/P31	2<x<25	14

Note - All samples are 0-2 ft composites, except as noted.
*Total PCB Concentration is comprised solely of Aroclor 1248. No other Aroclors were detected.
< - Analyte was not detected above the listed detection limit in the laboratory.
X = Concentration of PCB in the sample.

Ten samples were selected at random to undergo field screening analysis using immunoassay techniques developed by EnSYS Corporation. For convenience, these samples were analyzed at ENSR's facility in Wilmington, Massachusetts subsequent to the completion of the field sampling activities. The screening analyses were set up to determine if the total PCB concentration in the soil samples was less than 2 mg/kg, between 2 and 25 mg/kg or greater than 25 mg/kg. The results of these analyses revealed that 5 of the samples contained PCBs between 2 and 25 mg/kg, two less than 2 mg/kg, two greater than 25 mg/kg and one which equaled 2 mg/kg.

3.2.3 Laboratory / Screening Results Comparison

Table 3-3 compares the results of the immunoassay field screening method verses the laboratory results. The results indicate that the field screening kits are in excellent agreement with the samples analyzed by the laboratory. Nine of the ten screening results agree perfectly with the laboratory results. The one sample where agreement is not perfect is S-4A, in which the field screening result is 2 mg/kg and the laboratory result is non-detect, with a detection limit of 0.2 mg/kg. This small difference can reasonably be attributed to normal sample variability.

3.3 cPAH Soil Samples

3.3.1 Laboratory Results

Table 3-4 presents the results of the laboratory analysis of soil samples for cPAHs. Figure 3-2 shows the total cPAH concentration at each sample location.

The results of the 29 soil samples show 12 samples in which at least one cPAH exceeded the specific action level identified on the revised criteria list published on January 19, 1993 (Appendix E). In another 10 samples, the laboratory detection limit was slightly higher than the action level. The elevated detection limits are due to dilutions required to minimize matrix interferences. Therefore, some of these samples may have concentrations of individual cPAH compounds below their specific cleanup limit but could not be confirmed due to the elevated laboratory detection level. The concentration of 7 of the 29 samples exceeded the total cPAH action level of 29 mg/kg. The concentration of these four samples ranged from 32.8 mg/kg (P/P-11) to 210 mg/kg (S5-A). The samples that contain the elevated concentrations of individual and total cPAH compounds are located in Area 5 and to the southeast of Area 5.

TABLE 3-4

Summary of Carcinogenic PAHs in Soils (mg/kg)
Laboratory Results
Samples Collected November, 1992
UOP Site, East Rutherford, NJ

Sample Location	Benzo(b)-fluoranthene (4.0)***	Benzo(k)-fluoranthene (4.0)	Benzo(a)-anthracene (4.0)	Benzo(a)-pyrene (0.66)	Chrysene (40.0)	Dibenz(a,h)-anthracene (0.66)	Indeno(1,2,3-cd)-pyrene (4.0)	TOTAL cPAH**
S-4A	<.46	<.46	0.1	<.46	0.12	<.46	<.46	0.2
S-4B (2-5')	<.64	<.64	<.64	<.64	<.64	<.64	<.64	<0.64
P/P-42*	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1
S-5A	47	37	43	40	43	<47	<47	210
S-5B (2-3')	22	22	24	22	24	<41	<41	114
P/P7	0.60	0.60	0.4	0.56	0.52	<.4	<.4	2.7
P/P8	0.39	0.27	0.23	0.28	0.28	0.068	0.17	1.69
P/P9	0.15	0.097	0.11	0.14	0.15	<.42	0.064	0.71
P/P10	0.67	0.32	0.4	0.57	0.53	<1.4	0.17	2.66
P/P11	6.3	5.2	5.6	5.6	5.8	1.0	2.0	31.5
P/P12	8.9	8.9	9.3	8.9	9.3	0.89	3.0	49.2
P/P13	3.6	2.9	3	3.4	3	0.56	1.4	17.9
P/P14	5.7	5.7	8.8	8.5	8.8	<0.32	<0.32	37.5
P/P15	2.2	1.5	1.6	1.9	1.6	0.22	0.72	9.74
P/P16	2.8	2.5	2.6	3.0	2.7	0.68	1.2	15.48
P/P17	31	30	34	33	36	<38	17	181
P/P18	22	22	23	24	25	<43	<43	116
P/P19	3.2	3.1	0.4	3.6	3.8	0.59	1.2	15.9

TABLE 3-4 (Cont'd)

Summary of Carcinogenic PAHs in Soils (mg/kg)
Laboratory Results
Samples Collected November, 1992
UOP Site, East Rutherford, NJ

Sample Location	Benzo(b)-fluoranthene (4.0)***	Benzo(k)-fluoranthene (4.0)	Benzo(a)-anthracene (4.0)	Benzo(a)-pyrene (0.66)	Chrysene (40.0)	Dibenz(a,h)-anthracene (0.66)	Indeno(1,2,3-cd)-pyrene (4.0)	TOTAL cPAH**
P/P20	<2.3	< 2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3
P/P21	<0.58	<.58	<.58	<.58	<.58	<.58	<.58	<0.6
P/P22	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
P/P40*	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3
P/P23	<2.2	<2.2	<2.2	<2.2	0.27	<2.2	<2.2	0.3
P/P24	0.65	0.58	0.53	0.49	0.58	<2.2	<2.2	2.8
P/P25	2.4	2.5	3.8	3.5	3.9	0.82	1.3	18.2
P/P26	0.41	0.34	0.31	0.36	0.36	<0.8	<.8	1.8
P/P27	0.37	0.30	0.23	0.29	0.34	<1.8	<1.8	1.5
P/P28	0.37	0.37	0.32	0.4	0.4	<2.7	<2.7	1.9
P/P29	0.51	0.37	<3.7	<3.7	0.37	<3.7	<3.7	1.3
P/P30	0.20	0.20	0.18	0.18	0.24	<1.7	<1.7	1.0
P/P31	1.7	1.3	0.49	1.6	0.62	<1.9	0.35	6.1

NOTE - All samples are 0-2 ft. composite, except as noted.
*Blind duplicate of sample directly above.
**Total cPAH is the sum of all detected values.
***Individual action level is listed below each compound.
< - Analyte was not detected above the listed detection limit.

3.3.2 Screening Results

Table 3-5 summarizes the results of the screening analyses for cPAHs. The laboratory was instructed to choose 10 samples at random for analyses using the Selected Ion Methodology. However, due to oversight by the laboratory, all of the PAH samples were analyzed using this method.

The results of the 35 soil samples analyzed using the Selected Ion Method show 13 samples in which at least one of the individual cPAHs is in excess of its specific action level of 0.66 or 2.5 mg/kg. The concentration of five samples exceed the total cPAH action level of 29 mg/kg. The concentration of these five samples range from 67 mg/kg (S-5B) to 243 mg/kg (P/P-18). The samples that contain the elevated concentrations of individual and total cPAH compounds are located in Areas 2 and 5.

This method did not experience detection level problems, as did method 8270. All detection levels were below action levels.

3.3.3 Laboratory / Screening Results Comparison

Table 3-5 compares the Selected Ion Method screening results verses the EPA 8270 method results. The data compare generally well for 20 of the 29 samples (without duplicates) analyzed. The remaining samples have differences greater than a factor of five. Some of these cases result from measurements made below instrument calibration of differing detection limits. In most cases, however, there is no apparent reason for the discrepancies. There is no pattern; apparent concentration range, bias for one technique over the other, moisture content or actual PAH components present do not appear related to the discrepancies. Therefore, the use of the Select Ion Method for screening cPAH compounds during remediation activities may be limited at best.

3.4 VOC Soil Samples

3.4.1 Laboratory Analysis

Table 3-6 summarizes the results of the laboratory analysis of the samples. Figure 3-3 shows the VOC concentrations at each location.

Total VOC concentrations ranged from not detected to 13,717 mg/kg. Sample V-5 contained the highest concentrations of VOC compounds and was the only sample containing VOC compounds above 1,000 mg/kg. Detected compounds include benzene, 1,3 & 1,4 dichlorobenzene, 1,2-

TABLE 3-5

Carcinogenic PAH in Soils - Results Comparison
Laboratory vs. Screening (mg/kg)
UOP Site, East Rutherford, NJ

Sample Location	Benzo(b) & (k)-fluoranthene**		Benzo(a)-anthracene		Benzo(a)-pyrene		Chrysene		Dibenz(a,h)-anthracene		Indeno(1,2,3-cd)-pyrene		TOTAL cPAH***	
	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab
S-4A	0.42	<.46	0.5	0.1	0.56	<.46	0.67	0.12	0.25	<.46	0.11	<.46	2.51	0.22
S-4B (2-5')	0.05	<.64	0.05	<.64	0.05	<.64	0.05	<.64	0	<.64	0	<.64	0.2	<.64
P/P-42*	0	<2.1	0	<2.1	0	<2.1	0	<2.1	0	<2.1	0	<2.1	0	<2.1
S-5A	2.67	84	2.53	43	2.14	40	2.57	43	0.86	<47	0.43	<47	11.20	210
S-5B (2-3')	10.34	44	14.38	24	12.6	22	12.09	24	7.03	<41	3.63	<41	60.1	114
P/P7	0.24	1.2	0.27	0.4	0.34	0.56	0.38	0.52	0.06	<0.4	0.03	<0.4	1.32	2.68
P/P8	0.034	0.66	0.034	0.23	0	0.28	0.07	0.28	0	0.068	0	0.17	0.14	1.69
P/P9	0.064	0.247	0.032	0.11	0.032	0.14	0.064	0.15	0.032	<.42	0	0.064	0.224	0.71
P/P10	0.072	0.99	0.072	0.4	0.108	0.57	0.108	0.53	0.072	<1.4	0	0.17	0.432	2.66
P/P11	1.22	11.5	1.68	5.6	1.37	5.6	1.56	5.8	0.64	1.0	0.31	2.0	6.78	31.5
P/P12	3.3	17.8	4.62	9.3	3.69	8.9	4.05	9.3	1.97	0.89	0.96	3.0	18.59	49.19
P/P13	0.18	6.5	0.28	3.0	0.25	3.4	0.28	3.0	0.14	0.56	0.07	1.4	1.20	17.9
P/P14	16.98	11.4	23.34	8.8	21.52	8.5	21.99	8.8	11.13	<32	5.5	<32	100.5	37.5
P/P15	1.7	3.7	2.38	1.5	2.41	1.9	2.38	1.6	1.22	0.22	0.61	0.72	10.7	9.6
P/P16	0	5.3	0.029	2.6	0	3.0	0.029	2.7	0	0.66	0	1.2	0.058	15.5
P/P17	23.2	61	34.83	34	26.78	33	29.64	36	13.9	<38	7.37	17	135.7	181

TABLE 3-5 (Cont'd)

Carcinogenic PAH in Soils - Results Comparison
Laboratory vs. Screening (mg/kg)
UOP Site, East Rutherford, NJ

Sample Location	Benzo(b) & (k)-fluoranthene**		Benzo(a)-anthracene		Benzo(a)-pyrene		Chrysene		Dibenz(a,h)-anthracene		Indeno(1,2,3-cd)-pyrene		TOTAL cPAH***	
	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab
P/P18	59.5	44	29.1	23	69.86	24	7.5	25	32.99	<43	16.68	<43	215.6	116
P/P19	0.31	6.3	0.53	0.4	0.39	3.6	0.44	3.8	0.17	0.59	0.08	1.2	1.92	15.9
P/P20	0.3	<2.3	0.34	<2.3	0.34	<2.3	0.34	<2.3	0.26	<2.3	0.09	<2.3	1.67	<2.3
P/P21	0	<.58	0	<.58	0	.58	0	.58	0	.58	0	<.58	0	1.74
P/P22	0	<2.5	0.19	<2.5	0.19	<2.5	0.19	<2.5	0	<2.5	0	<2.5	0.57	<2.5
P/P40*	0	<2.3	0.17	<2.3	0.17	<2.3	0.17	<2.3	0	<2.3	0	<2.3	0.51	<2.3
P/P23	1.69	<2.2	3.89	<2.2	1.69	<2.2	0	0.27	1.52	<2.2	0.85	<2.2	9.64	0.27
P/P24	0.34	1.23	0.68	0.53	0.51	0.49	0.61	0.58	0.34	<2.2	0	<2.2	2.48	2.83
P/P25	0.33	4.9	0.55	3.8	0.44	3.5	0.51	3.9	0.18	0.82	0.07	1.3	2.08	18.2
P/P26	0	0.75	0.061	0.31	0.061	0.36	0.061	0.36	0.061	<0.8	0	<.8	0.244	1.78
P/P27	0.27	0.67	0.27	0.23	0.27	0.29	0.27	0.34	0	<1.8	0	<1.8	1.08	1.53
P/P28	0.4	0.74	0.2	0.32	0.4	0.4	0.4	0.4	0.2	<2.7	0	<2.7	1.6	1.86

TABLE 3-5 (Cont'd)

Carcinogenic PAH in Soils - Results Comparison
Laboratory vs. Screening (mg/kg)
UOP Site, East Rutherford, NJ

Sample Location	Benzo(b) & (k)-fluoranthene**		Benzo(a)-anthracene		Benzo(a)-pyrene		Chrysene		Dibenz(a,h)-anthracene		Indeno(1,2,3-cd)-pyrene		TOTAL cPAH***	
	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab
P/P29	0	0.51	0.28	<3.7	0.28	<3.7	0.28	0.37	0	<3.7	0	<3.7	0.84	0.88
P/P30	0	0.4	0.13	0.18	0.13	0.18	0.13	0.24	0	<1.7	0	<1.7	0.39	1.0
P/P31	0	3	0.147	0.49	0.147	1.6	0.147	0.62	0	<1.9	0	0.35	0.441	6.1

NOTE:

(1) All samples are 0-2 ft. composite, except as noted.

(2) Field Screening method reported all non-detect results as 0's.

(3) The equation, $\frac{\text{result} \times 2.5}{\text{1-\%H}_2\text{O}} = \text{mg/kg}$ was used to convert the field result to mg/kg.

*Blind duplicate of sample directly above.

**Results are the sum of Benzo(b)-fluoranthene and Benzo(k)-fluoranthene compounds.

***Total cPAH is the sum of all detected values.

< - Analyte was not detected above the listed detection limit.

TABLE 3-6

Summary of VOCs in Soils
Laboratory Results (mg/kg), dry wt.
Samples Collected November, 1992
UOP Site, East Rutherford, NJ

Sample ID / Compound / Sample Depth	V-1 3'6"-4'0"	V-2 3'6"-4'0"	V-3 3'6"-4'0"	V-4 4'4"-4'10"	V-5 5'6"-6'0"	V-10* Dup.	V-6 1'0"-1'6"	V-7 5'6"-6'0"	V-8 6'6"-7'0"	V-9 3'0"-3'6"
Benzene	<0.006	<0.006	<0.006	4.4	<280	<440	<0.006	<0.47	<0.031	0.028
Trichloroethene	<0.006	<0.006	0.011	<1.6	300	630	<0.006	<0.47	<0.031	<0.006
Toluene	0.002	<0.006	0.003	3.7	180	350	<0.006	0.17	0.007	<0.006
Tetrachloroethene	<0.006	<0.006	<0.006	<1.6	56	97	<0.006	<0.47	<0.031	<0.006
Ethylbenzene	<0.006	<0.006	<0.006	15.0	<280	<440	<0.006	0.93	<0.031	<0.006
Total Xylene	<0.006	<0.006	<0.006	<2.1	<280	<440	<0.006	<0.43	<0.031	0.004
Chlorobenzene	<0.006	<0.006	0.01	2.1	<280	<440	<0.006	7.5	<0.031	<0.006
1,3 1,4-Dichlorobenzene	<0.012	<0.012	<0.005	1.2	56	<890	<0.011	2.7	0.007	0.004
total-1,2-Dichloroethene	<0.006	<0.006	0.005	<1.6	120	190	<0.006	<0.47		<0.006
1,2-Dichlorobenzene	<0.006	<0.006	<0.006	0.75	400	450	<0.006	0.18	0.05	<0.006
1,1,2,2-Tetrachloroethane	<0.006	<0.006	<0.006	<1.6	6,400	12,000	<0.006	<0.47	0.8	<0.006
2-Butanone	<0.012	<0.012	<0.011	<3.1	<560	<890	<0.011	<0.93	<0.061	0.022
Total VOC**	0.002	<0.012	0.03	27	7,512	13,717	<0.011	12	0.9	0.06

*Sample V-10 is a duplicate of V-5.
**Total VOC is a sum of all the detected values.
< - Analyte was not detected above the listed detection limit.

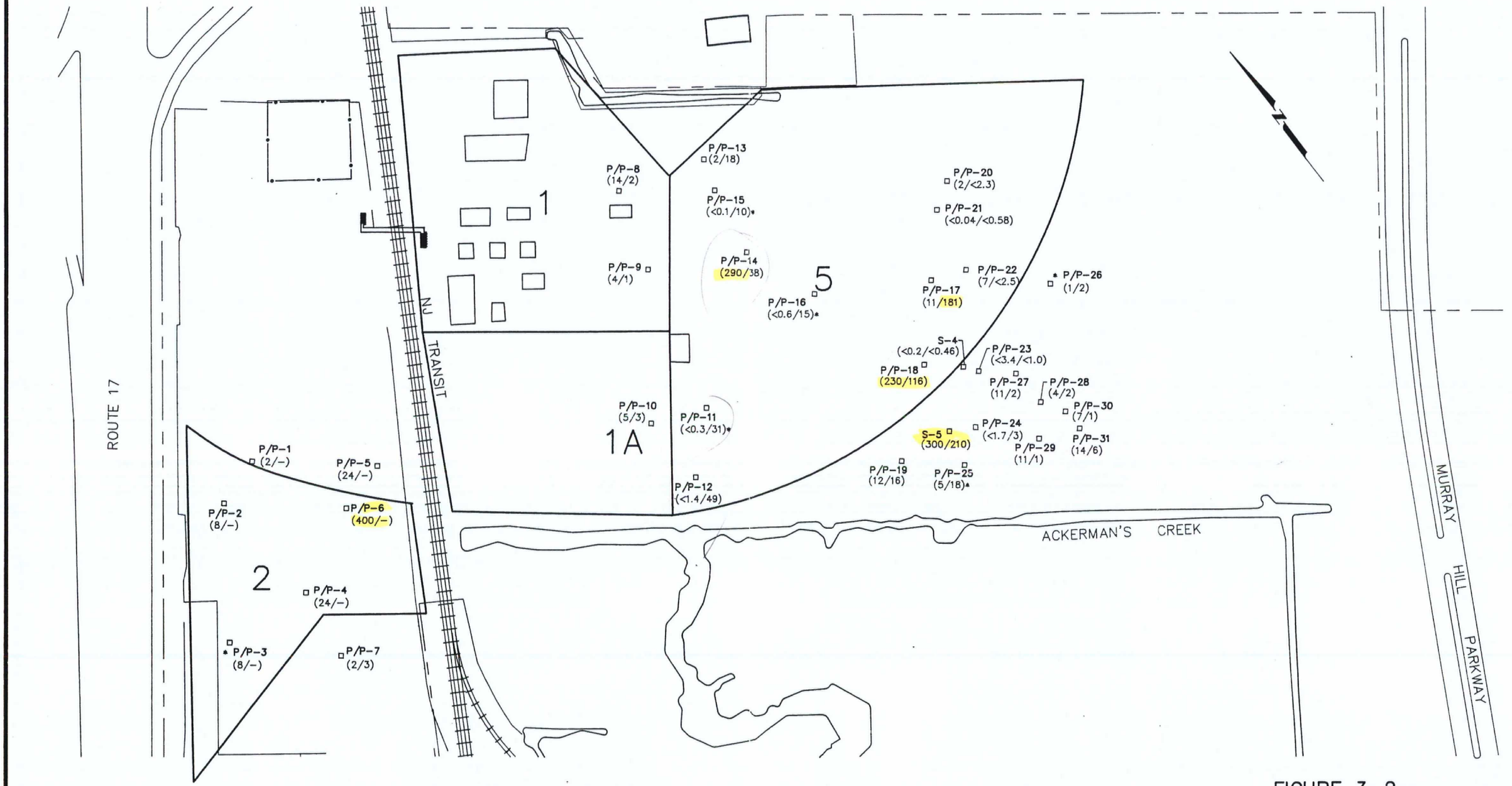


FIGURE 3–2

LEGEND

□ SURVEYED LOCATION OF PCB/PAH SOIL SAMPLES

( )* CONCENTRATION EXCEEDS ACTION LEVEL FOR INDIVIDUAL CPAH's

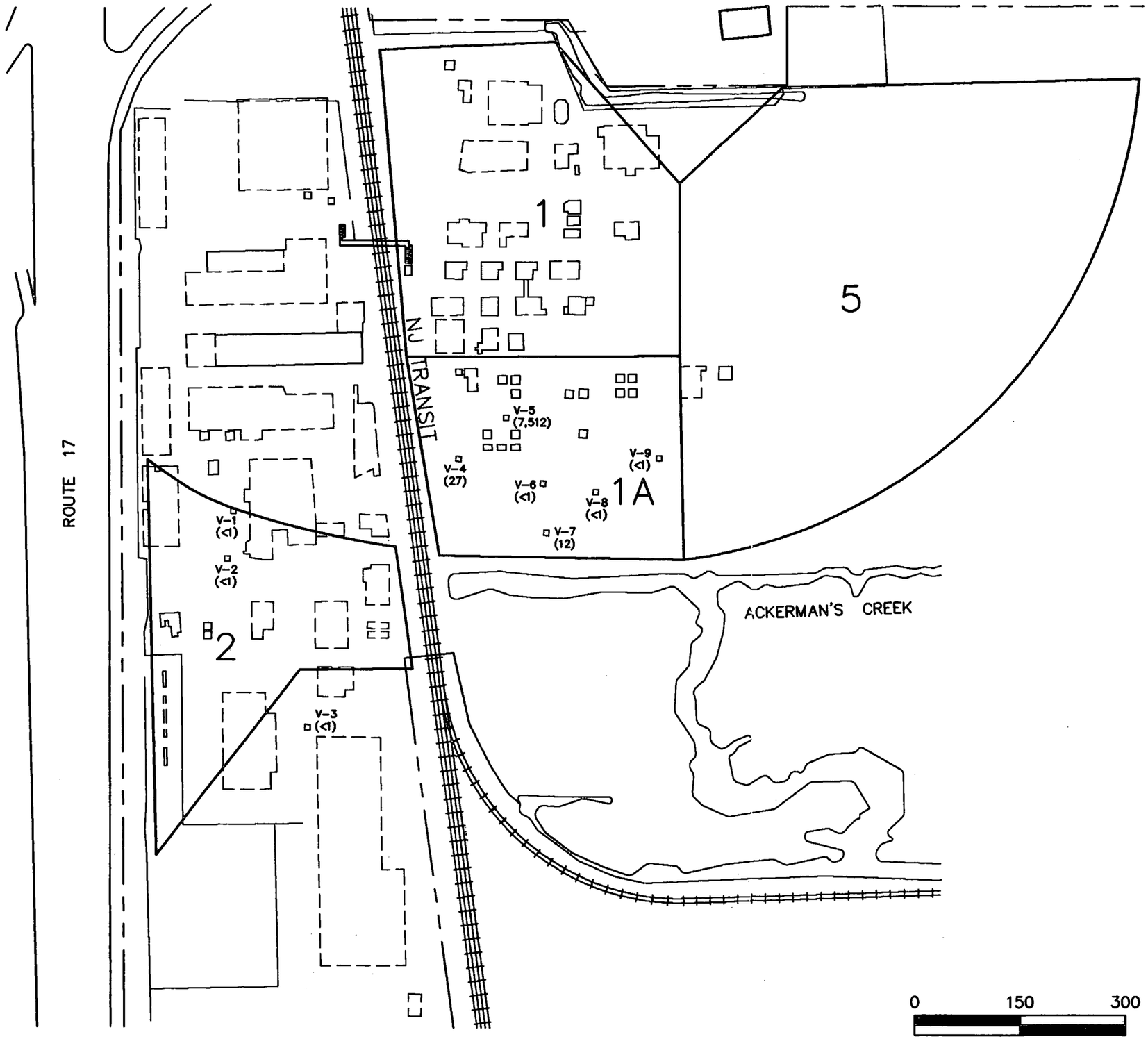
NOTE
* NOT FOUND IN FIELD; LOCATION PLOTTED FROM ENSR MAP

ENSR CONSULTING & ENGINEERING

PCB/PAH SOIL SAMPLE LOCATIONS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	3/93	0186–002–525

0186114B



LEGEND

▫ VOC SOIL SAMPLE LOCATION

( ) TOTAL VOC CONCENTRATION (mg/kg)

NOTE

THE TOTAL VOC CONCENTRATION IS THE SUM OF ALL DETECTED VALUES.

0 150 300

SCALE IN FEET
1" = 150'

FIGURE 3-3

ENSR CONSULTING & ENGINEERING

VOC SOIL SAMPLE LOCATIONS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	2/94	0186-002-526

0186121B

dichlorobenzene, total-1,2-dichloroethene, 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene and trichloroethene and xylenes.

3.4.2 Screening Analysis

Table 3-7 summarizes the results of the samples which were screened utilizing a field GC.

As previously discussed, the screened samples were analyzed by the use of a Photovac field GC for the following compounds:

- Benzene
- Toluene
- Ethylbenzene
- Total Xylene
- Trichloroethylene
- Tetrachloroethane

The results of the samples revealed that only samples V-4, V-5 and V-7 contained some of these compounds. Soil samples results ranged from <0.23 mg/kg to 275.8 mg/kg. The highest results were detected in sample V-5.

3.4.3 Laboratory / Screening Results Comparison

Table 3-7 compares the field GC screening results verses the results of EPA Method 8240.

The results of the screening analysis were generally in agreement with the laboratory results with one significant exception. The field GC used was equipped with a detector lamp which was not sensitive to 1,1,2,2-tetrachloroethane. This compound was one of the major components in one of the soil samples (V-5) and its duplicate (V-10). Field results for other components in this sample were lower than measured by the laboratory. These lower readings may have resulted from a depressed field instrument response caused by the high concentration of tetrachloroethane. Future use of the field screening method should include a lamp of sufficient energy to detect 1,1,2,2-tetrachloroethane. This change may not improve the response of other compounds; however, this will not be important given that the action level for 1,1,2,2-tetrachloroethane, at 20 mg/kg, is much lower than the total VOC action level of 1000 mg/kg. Determining whether 1,1,2,2-tetrachloroethane is above its action limit will be more critical when it is present in a sample.

TABLE 3-7

VOCs In Soils - Results Comparison
Laboratory vs. Field Testing (mg/kg)
UOP Site, East Rutherford, NJ

Compound	Sample ID / Sample Depth	V-1 3'6"-4'0"	V-2 3'6"-4'0"	V-3 3'6"-4'0"	V-4 4'4"-4'10"	V-5 5'6"-6'0"	V-10* Dup.	V-6 1'0"-1'6"	V-7 5'6"-6'0"	V-8 6'6"-7'0"	V-9 3'0"-3'6"
Benzene	Lab	<0.006	<0.006	<0.006	4.4	<280	<440	<0.006	<0.47	<0.031	0.028
	Field	<0.23	<0.23	<0.23	77	19	25	<0.23	30	<0.23	<0.23
Trichloroethene	Lab	<0.006	<0.006	<0.011	<1.6	300	630	<0.006	<0.47	<0.031	<0.006
	Field	<0.19	<0.19	<0.19	<0.19	147	138	<0.19	<0.19	<0.19	<0.19
Toluene	Lab	0.002	<0.006	0.003	3.7	180	350	<0.006	0.17	0.007	<0.006
	Field	<0.23	<0.23	<0.23	67	96	107	<0.23	6.1	<0.23	<0.23
Tetrachloroethene	Lab	<0.006	<0.006	<0.006	<1.6	56	97	<0.006	<0.47	<0.031	<0.006
	Field	<0.22	<0.22	<0.22	<0.22	12	9.6	<0.22	<0.22	<0.22	<0.22
Ethylbenzene	Lab	<0.006	<0.006	<0.006	15.0	<280	<440	<0.006	0.93	<0.031	<0.006
	Field	<0.23	<0.23	<0.23	66	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23
Total Xylene	Lab	<0.006	<0.006	<0.006	<2.1	<280	<440	<0.006	<0.43	<0.031	<0.004
	Field	<0.23	<0.23	<0.23	<0.23	1.8	1.4	<0.23	<0.23	<0.23	<0.23
Total VOC**	Lab	0.002	<0.006	0.003	27	7512	13,717	<0.006	12	0.9	0.06
	Field	<0.23	<0.23	<0.23	211	276	281	<0.23	37	<0.23	<0.23

*Sample V-10 is a duplicate of V-5.
**Total VOC is the sum of all the detected values as shown on Table 3-6.
< = Analyte was not detected above the listed detection limit.

The field screening results for samples V-4 and V-7 were higher than the laboratory results for several compounds. This result is not unexpected and may have two major causes: loss of VOC to the atmosphere during shipment to and analysis in the laboratory, and inaccuracies introduced into both methods by the high moisture content in the soil.

In summary, the VOC screening method is worth pursuing as a method for future use. However, some additional testing, with a higher energy lamp is necessary to adequately quantify 1,1,2,2-tetrachloroethane.

3.5 Groundwater Samples

3.5.1 Laboratory Results

Tables 3-8, 3-9 and 3-10 summarize the results of the laboratory analysis of the samples for VOC and BNA compounds. Figure 3-4 shows the total VOC concentration of each sample location.

The results of the groundwater samples collected from the seven monitoring wells installed at the site in Areas 1, 1A and 2 show total VOC concentrations ranging from not detected to 38.9 mg/l. Monitoring well MW-37 is the only well which contains individual VOC compounds greater than 1 mg/l. This well also contains total VOC compounds greater than 10 mg/l. This well is located on the border of Areas 1 and 1A and is in the vicinity of soil boring V-5 which contains the highest concentration of VOC compounds in soil.

The concentrations of BNA compounds are generally much lower than VOCs, ranging from not detected to 0.295 mg/l. There is a very strong correlation between the presence of VOCs and BNAs in the samples. That is, the samples with higher total VOC concentrations have higher total BNA concentrations. However, as stated above, BNA concentrations are much lower than VOC concentrations.

As shown in Table 3-10, measurements of groundwater samples for pH ranged from 6.36 to 7.71. Conductivity ranged from 0.464 to 2.92 µmhos while dissolved oxygen in the samples ranged from 12.14 to 13.00 mg/l.

3.5.2 Screening Results

Table 3-11 summarizes the VOC field screening results for groundwater samples. The results show concentrations ranging from not detected to a total VOC concentration of 23 mg/L. The highest concentrations are contained in MW-37, which is the only sample in which an individual compound concentration exceeded 1 mg/L. The total VOC concentration also exceeded 10 mg/L.

TABLE 3-8

Summary of VOCs in Groundwater
Laboratory Results (mg/L)
Samples Collected, December, 1992
UOP Site, East Rutherford, NJ

Compound	Sample ID								
	MW-35	MW-36	MW-37	MW-38	MW-42*	MW-39	MW-40	MW-41	BLANK
Benzene	0.225	0.288	1.80	0.026	0.028	<0.005	<0.005	<0.005	<0.005
Trichloroethene	0.011	<0.013	6.70	0.00115	0.002	<0.005	<0.005	<0.005	<0.005
Toluene	0.020	0.135	7.40	0.0023	0.003	<0.005	0.002	<0.005	<0.005
Tetrachloroethene	<0.025	<0.013	2.90	<0.005	0.002	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	0.006	<0.013	0.380	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Xylenes	0.013	0.007	2.0	0.002	0.003	<0.005	0.002	<0.005	<0.005
Chlorobenzene	0.275	0.325	1.4	0.027	0.029	<0.005	<0.005	<0.005	<0.005
1,2-Dichlorobenzene	0.115	0.47	2.3	0.001	0.002	<0.005	<0.005	<0.005	<0.005
trans-1,2,-Dichloroethene	0.96	<0.013	6.1	0.001	0.002	<0.005	<0.005	0.003	<0.005
1,1,2,2-Tetrachloroethane	0.08	<0.013	7.6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vinyl Chloride	0.095	<0.025	<1.0	<0.01	<0.01	<0.01	<0.01	0.004	<0.01
1,3 1,4-Dichlorobenzene	<0.05	0.012	0.35	0.003	0.003	<0.01	<0.01	<0.01	<0.01
Total VOCs**	1.8	1.2	38.9	0.06	0.07	0	0.004	0.007	0

*Sample MW-42 is a duplicate of MW-38.
**Total VOCs is a sum of all the detected values.
< - Analyte was not detected above the listed detection limit.

TABLE 3-9

Summary of BNAs in Groundwater
Laboratory Results (mg/L)
Samples Collected December, 1992
UOP Site, East Rutherford, NJ

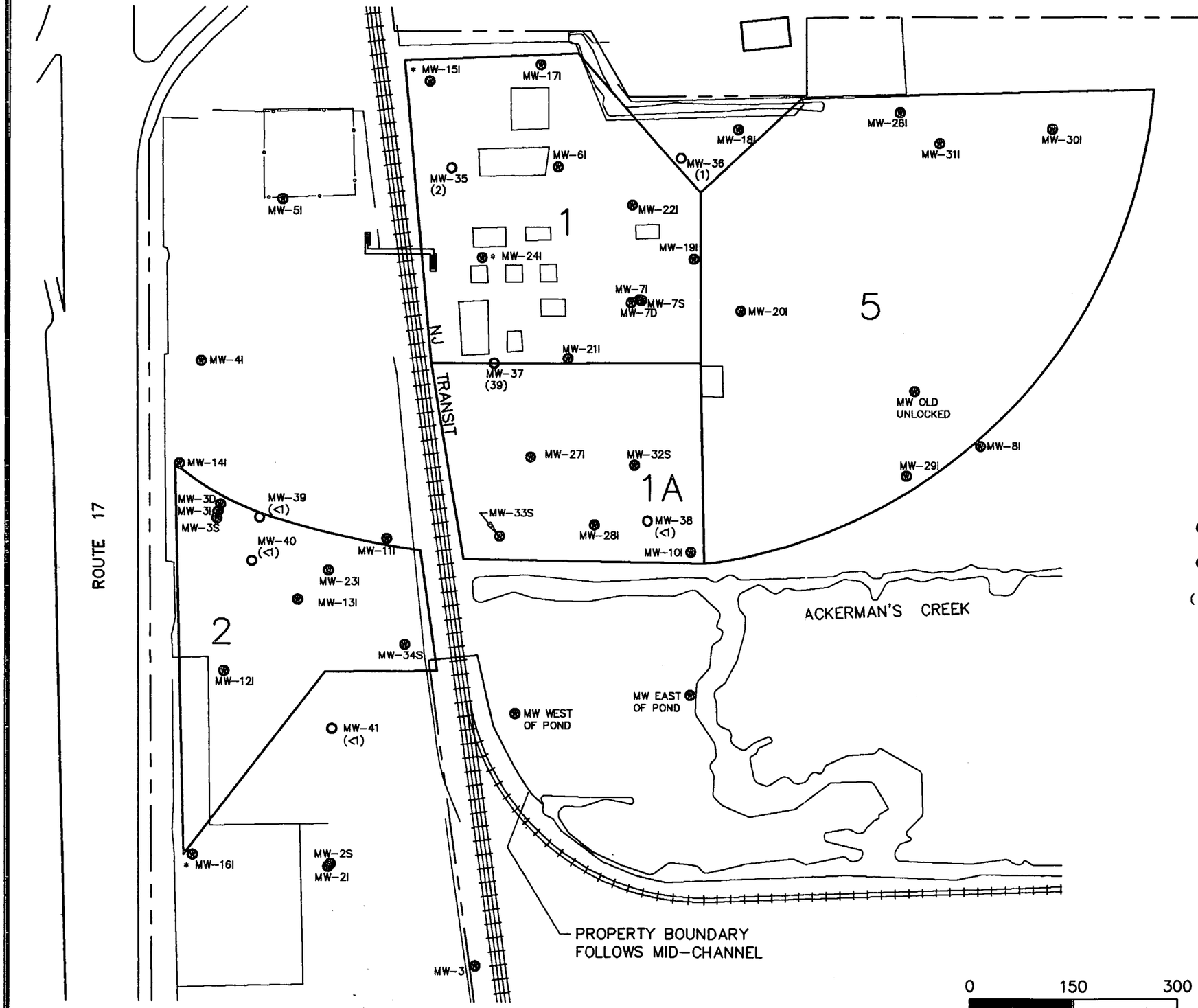
Compound	SAMPLE ID								
	MW-35	MW-36	MW-37	MW-38	MW-42*	MW-39	MW-40	MW-41	BLANK
1,2-Dichlorobenzene	0.061	0.194	0.295	<0.0095	<0.0098	<0.0098	<0.01	<0.0095	<0.01
Phenol	0.017	0.0021	0.012	<0.0095	0.0039	<0.0098	<0.01	0.0017	<0.01
1,4-Dichlorobenzene	<0.0095	0.0064	0.086	<0.0095	0.0014	<0.0098	<0.01	<0.0095	<0.01
bis(2-Ethylhexyl) Phthalate	<0.0095	0.0098	<0.019	<0.0095	<0.0095	<0.0098	<0.01	<0.0095	<0.01
1,3-Dichlorobenzene	<0.0095	<0.01	0.027	<0.0095	<0.0095	<0.0098	<0.01	<0.0095	<0.01
Naphthalene	<0.0095	<0.01	0.0049	0.012	0.012	<0.0098	<0.01	0.0011	<0.01
Phenanthrene	<0.0095	<0.01	<0.019	0.0011	0.0095	<0.0098	<0.01	<0.0095	<0.01
Diethylphthalate	<0.0095	<0.01	<0.019	<0.0095	0.0026	<0.0098	0.0036	<0.0095	<0.01
bis(2-Chloroethyl) Ether	<0.0095	<0.01	<0.019	<0.0095	0.0014	<0.0098	<0.01	<0.0095	<0.01
Total BNAs**	0.078	0.212	0.425	0.013	0.031	0	0.004	0.003	0

*Sample MW-42 is a duplicate of MW-38.
**Total BNAs is the sum of all detected values.
< - Analyte was not detected above the listed detection limit.

TABLE 3-10

Corrosivity, Conductivity, and Dissolved Oxygen Data
Groundwater Monitoring Wells
UOP Site, East Rutherford, NJ

Parameter	MW-35	MW-36	MW-37	MW-38	MW-39	MW-40	MW-41
pH	6.8	6.4	6.9	6.8	7.0	6.8	7.7
Conductivity (umhos)	1.06	1.48	0.69	2.30	2.92	2.17	0.46
Dissolved Oxygen (mg/L)	12.1	12.8	12.9	13.0	12.9	12.9	13.0



LEGEND

- ● SURVEYED EXISTING MONITORING WELL LOCATIONS
- ○ NEW MONITORING WELLS
- ( ) CONCENTRATION IN mg/l

NOTES:
* NOT FOUND IN FIELD; LOCATION PLOTTED FROM PREVIOUS MAPS

0 150 300

SCALE IN FEET
1" = 150'

FIGURE 3-4

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NEW VOC MONITORING WELLS UOP SITE EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	2/94	0186-002-526

01861168

TABLE 3-11

VOCs in Groundwater - Results Comparison
Laboratory vs. Field Screening (mg/l)
UOP Site, East Rutherford, NJ

Compound	Sample ID Collection	MW-35	MW-36	MW-37	MW-38	MW-42	MW-39	MW-40	MW-41	Blank
Benzene	Lab	0.225	.228	1.8	0.026	0.028	<0.005	<0.005	<0.005	<0.005
	Field	0.41	0.42	0.8	0.02	0.53	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	Lab	0.11	<0.013	6.7	0.0011	0.0021	<0.005	<0.005	<0.005	<0.005
	Field	0.02	<0.05	8.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	Lab	0.02	0.135	7.40	0.0023	0.0033	<0.005	.0015	<0.005	<0.005
	Field	0.03	0.15	>5	<0.5	0.21	<0.5	<.05	<0.5	<0.5
Tetrachloroethylene	Lab	<0.025	<0.013	2.9	<0.005	0.0027	(<0.005)	<0.005	<0.005	<0.005
	Field	<0.5	<0.5	8.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	Lab	0.006	<0.013	0.38	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Field	<0.5	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylene	Lab	0.013	0.007	2.0	0.002	0.003	<0.005	0.002	<0.005	<0.005
	Field	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total VOC**	Lab	1.8	1.2	38.9	0.06	0.07	<0.01	0.002	0.007	<0.01
	Field	0.46	0.57	23.25	0.02	0.74	<0.5	<0.5	<0.5	<0.5

*Sample MW-42 is a duplicate of MW-38.
**Total VOCs is the sum of all the detected values.
< - Analyte was not detected above the listed detection limit.
NA - sample not analyzed for the analyte.

3.5.3 Laboratory / Screening Results Comparison

Table 3-11 shows both the field screening and laboratory results. The field screening results compare very well with the laboratory results. In terms of the action levels, 1 mg/l for individual compounds and 10 mg/l for total VOCs, the correlation between the two methods is nearly perfect. In all samples, except MW-37, all concentrations for all compounds, are less than 1 mg/l. In sample MW-37 , the two methods are consistent in predicting above or below 1 mg/l for all compounds except benzene. For that compound, the laboratory analysis result is 1.8 and the field screening result is 0.8. This difference is relatively small and does not affect remediation decisions, given the higher concentrations of other compounds in the sample.

4.0 REMEDIATION QUANTITY ESTIMATES

4.1 Introduction

The remedial alternatives selected in the FS (ENSR, 1992) were developed for four different response areas (1, 1A, 2, and 5) which were previously identified for the UOP site. In order to develop the remedial alternatives for the site, the site was further broken down into remediation areas. Each remediation area was developed based on the following criteria:

- the medium (soil or groundwater) requiring remediation,
- the presence of contaminants above the action level identified.

The action levels established in the FS are presented in Table 4-1. The remediation areas are identified for both soil and groundwater. The remediation areas are:

- surface soil containing PCB/cPAH,
- surface soil containing lead,
- surface and subsurface soil containing VOCs,
- groundwater containing VOCs.

As discussed in Section 1.0, the remediation areas were not adequately delineated by existing data. With the information obtained from this sampling program, the remediation areas have been revised.

4.2 Lead

The remedial alternative for lead focuses on surface soils in which concentrations exceed the action level of 600 mg/kg. The recommended remedial alternative for the lead soils is a soil cover.

Figure 4-1 presents the remediation area for the soil containing lead. Both the new and previous lead data are shown on the figure. The short dashed line on the figure shows the interface between the soil cover for the lead remediation area and the soil cover for the PCB/cPAH remediation area. The previous remediation area, where it differs from the new area is shown with longer dashes. The size of the new remediation area is an estimated 320,000 ft^2 or 7.3 acres. The following paragraphs describe the rationale for revising the remediation area boundaries.

TABLE 4-1

Summary of Remediation Goals
UOP Site
East Rutherford, NJ

Medium	Contaminant	Remediation Goal, mg/kg
Surface Soil:		
	Carcinogenic PAH:	
	Benzo(b)fluoranthene	4.0
	Benzo(a)anthracene	4.0
	Benzo(a)pyrene	0.66
	Benzo(k)fluoranthene	4.0
	Chrysene	40.0
	Dibenzo(a,h)anthracene	0.66
	Indeno(1,2,3-cd)pyrene	4.0
	PCB	2
	Lead	600
Surface and Subsurface Soil:		
	VOC	1000
Groundwater:		
	VOC (total)	10 mg/l
	VOC (individual)	1 mg/l
Sewer Sediments:		
	All material	Removal and handling with other site soils

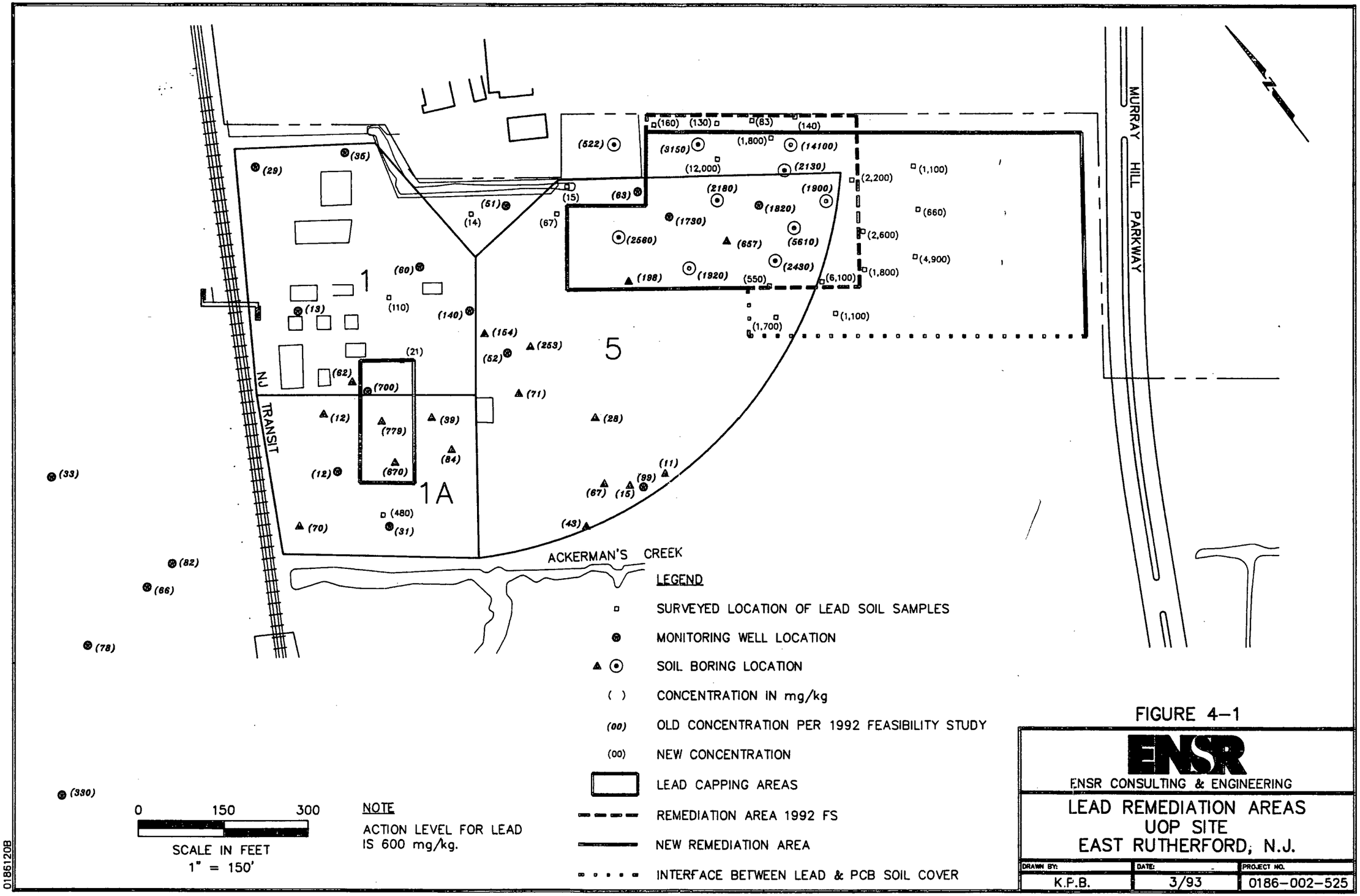

FIGURE 4–1

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LEAD REMEDIATION AREAS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	3/93	0186–002–525

0186120B

Based on the information presented in the FS, the soils in the northeast corner of Area 5 and portions of Areas 1 and 1A were identified for remediation. The new samples collected in Area 1 and 1A all had levels of lead below the action level. Based on this new information, the remediation area was appropriately delineated in the FS and therefore will not be changed.

In Area 5, several samples were collected northeast of Area 5 close to the property line in order to determine if the soil cover would impact the adjacent property. These soil samples (LX-7, LX-8, LX-10, and LX-14) contained lead below the action level of 600 mg/kg. Therefore the remediation boundary was moved 30 feet off the property line. The soil samples taken to delineate the lead contamination between Area 5 and Murray Hill Parkway all contained lead above the action level. It was therefore conservatively assumed that the cover would need to be extended to within 30 feet of the property line at Murray Hill Parkway.

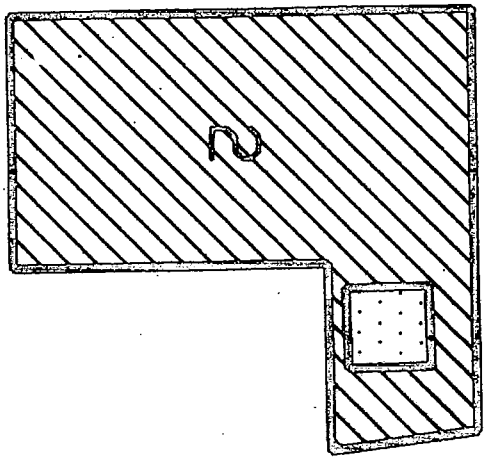
4.3 PCB/cPAH

Remediation of PCBs and cPAHs focuses on surface soils. The recommended alternative includes covering some soils and treating other soils. The following action levels define which soils are covered and which are treated:

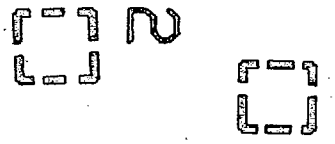
- Soils with PCB concentrations between 2 mg/kg and 25 mg/kg are covered,
- Soils with PCB concentrations above 25 mg/kg are treated,
- Soils are covered when an individual cPAH concentration exceeds the action level presented on Table 4-1,
- Soils with cPAH concentrations exceeding 29 mg/kg are treated.

Figure 4-2A and 4-2B presents the remediation areas for surface soil containing PCB/cPAH, based on the combination of old and new data. The short dashed line on the figure shows the interface between the soil cover for the lead remediation area and the soil cover for the PCB/cPAH remediation area. Longer dashes show the outline of the lead area and the previous configuration of the PCB/cPAH remediation area, where it differs from the new area. Based on the remediation area identified and the depth of 2 feet, an estimated 8150 yd^3 are targeted for treatment. Approximately 9600 cubic yards of soil from Area 1 and 2 will be excavated and placed under the cover in Area 5. The new cover area is an estimated 435,000 ft^2 or 10 acres. It should be noted that this new area is likely to incorporate a significant portion of wetlands. This report does not address any concerns raised by remediation in wetlands.

ROUTE 17



ROUTE 17



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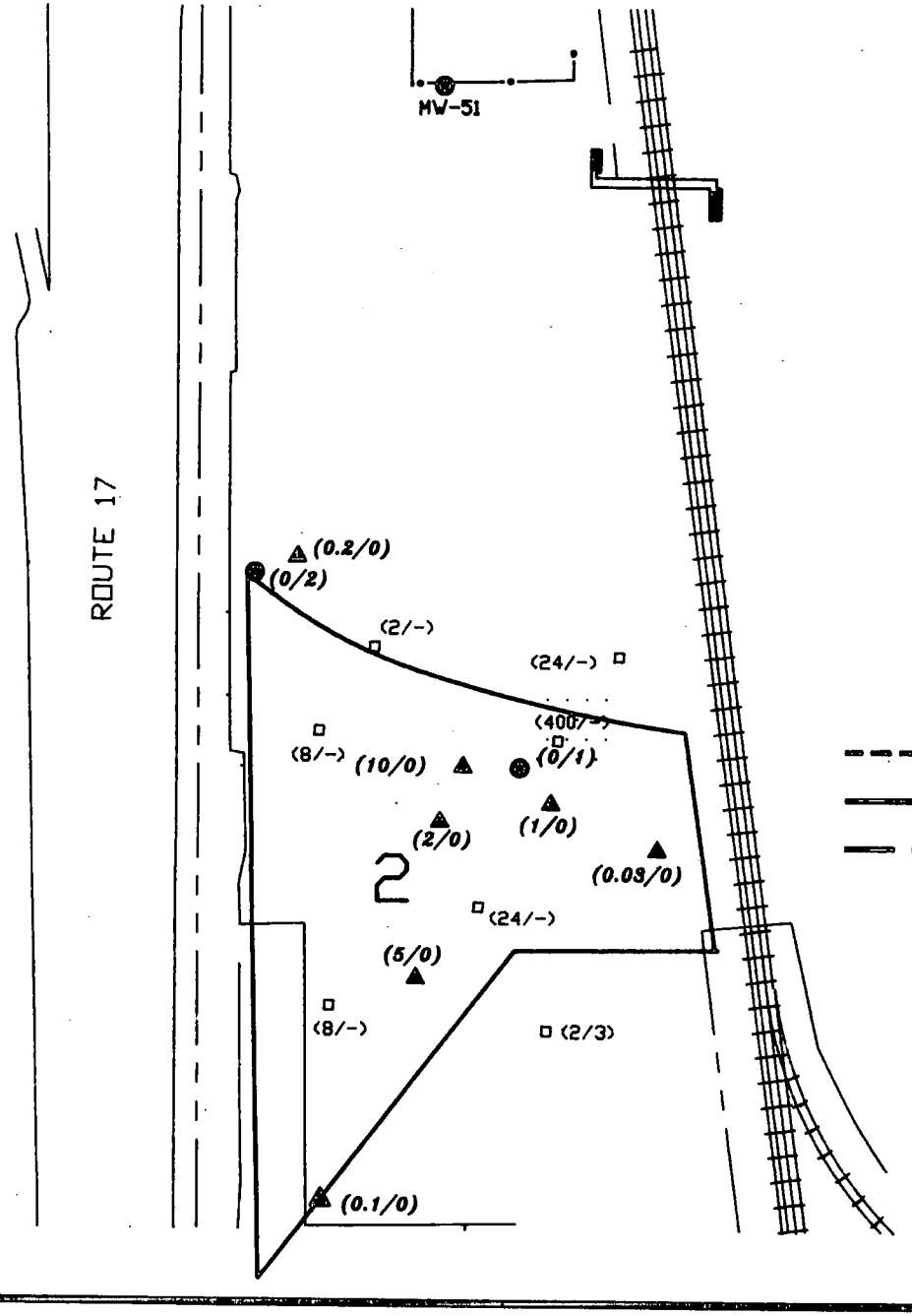

NOTES

* NOT FOUND IN FIELD; LOCATION PLOTTED FROM ENSR MAP

ACTION LEVEL FOR PCB IS 2 mg/kg

ACTION LEVEL FOR cPAH IS 2.5 mg/kg FOR INDIVIDUAL cPAH EXCEPT FOR BENZO (a) PYRENE & DIBENZO (a,h) ANTHRACENE WHICH IS 0.66 mg/kg

LEGEND

- SURVEYED LOCATION OF PCB/PAH SOIL SAMPLES
- ( )* CONCENTRATION EXCEEDS ACTION LEVEL FOR INDIVIDUAL cPAH's (TOTAL cPAH's <29 mg/kg)
- SURFACE SAMPLE LOCATION
- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- (0/0) NEW CONCENTRATIONS
- (0/0) OLD CONCENTRATIONS PER 1992 FEASIBILITY STUDY
- REMEDIATION AREA 1992 FS
- NEW REMEDIATION AREA
- INTERFACE BETWEEN LEAD & PCB SOIL COVER
- CAPPING AREA
- EXCAVATION & TREATMENT AREA
- EXCAVATE AND PLACE UNDER AREA 5 CAP

0 150 300

SCALE IN FEET
1" = 150'

FIGURE 4-2A

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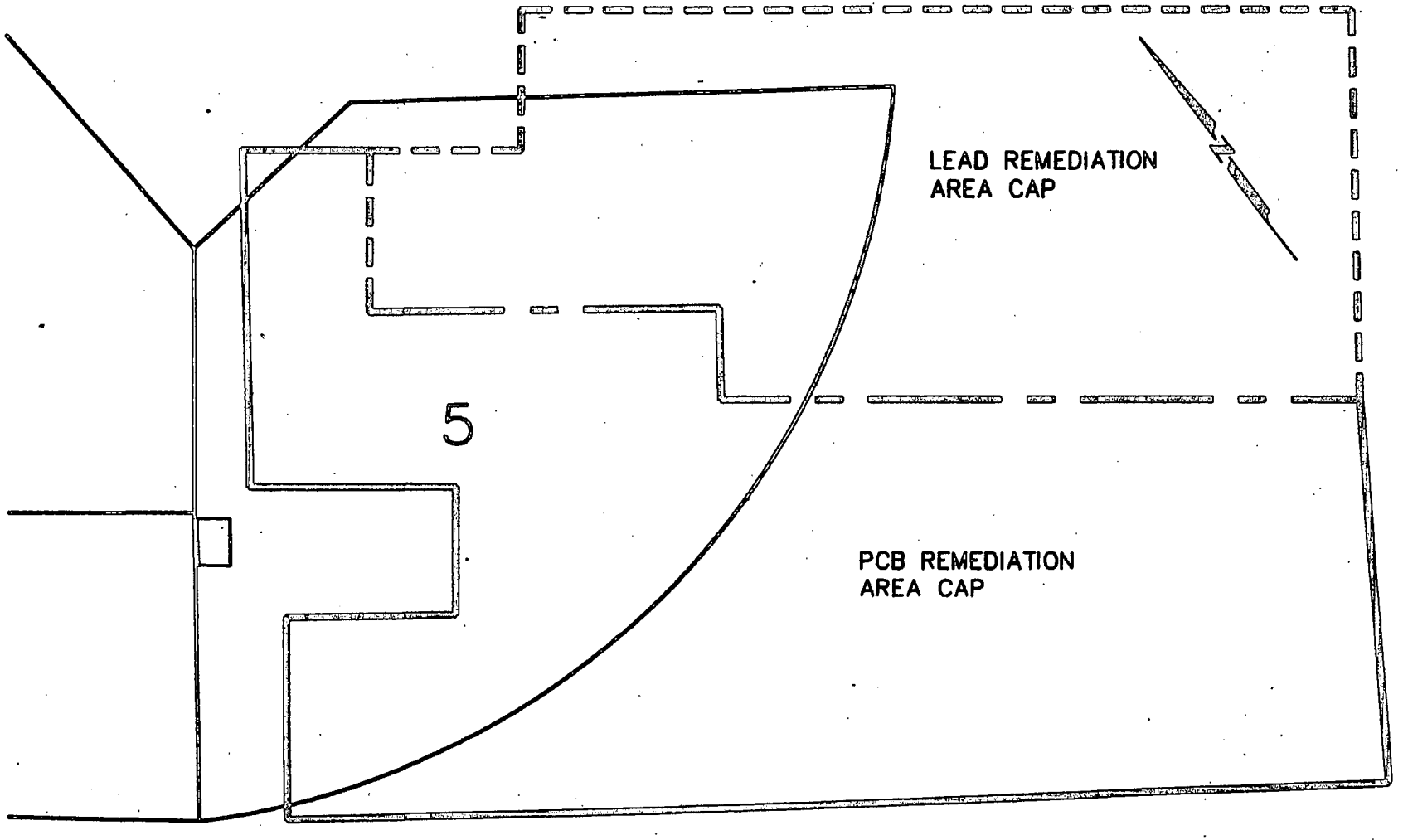
PCB/PAH REMEDIATION AREAS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	6/93	0186-002-525

018628A



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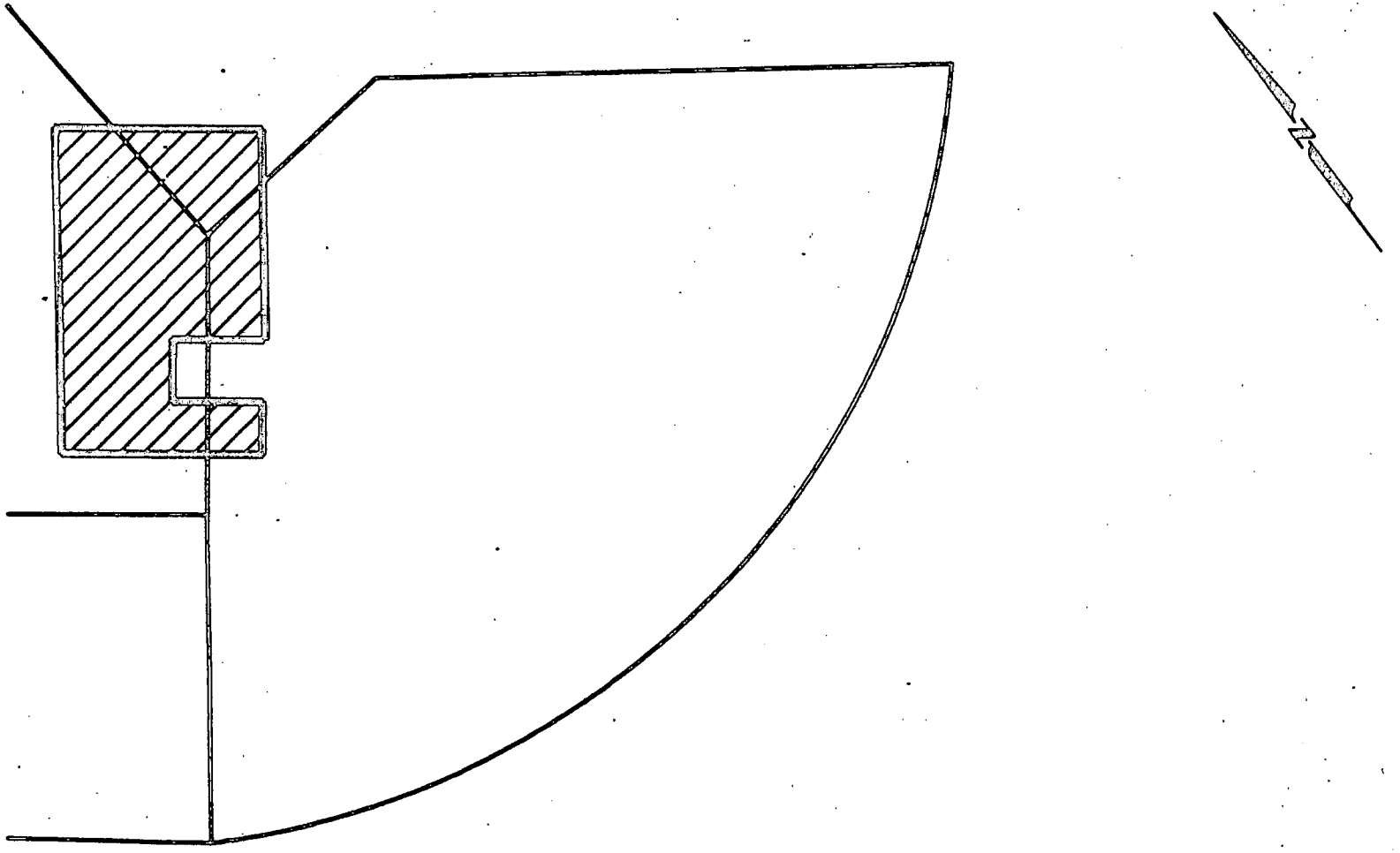

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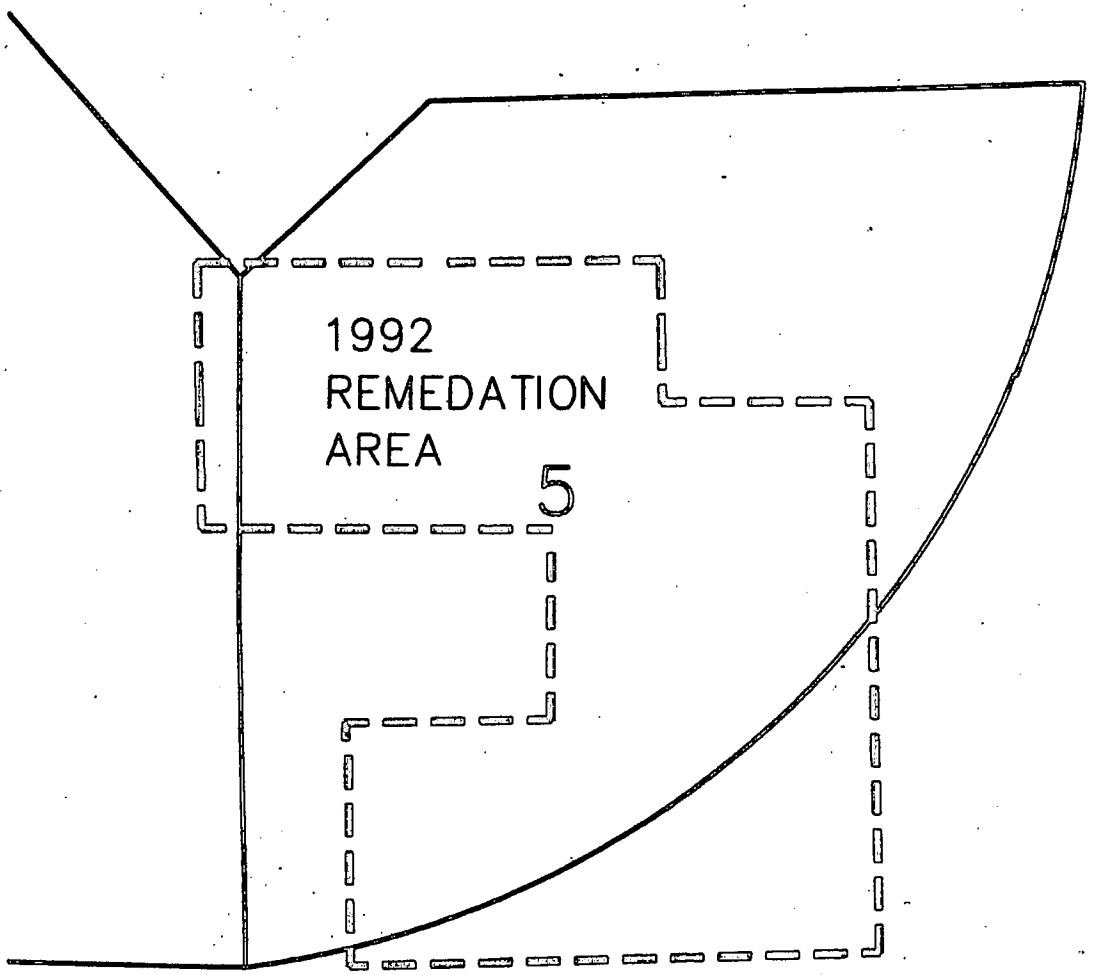

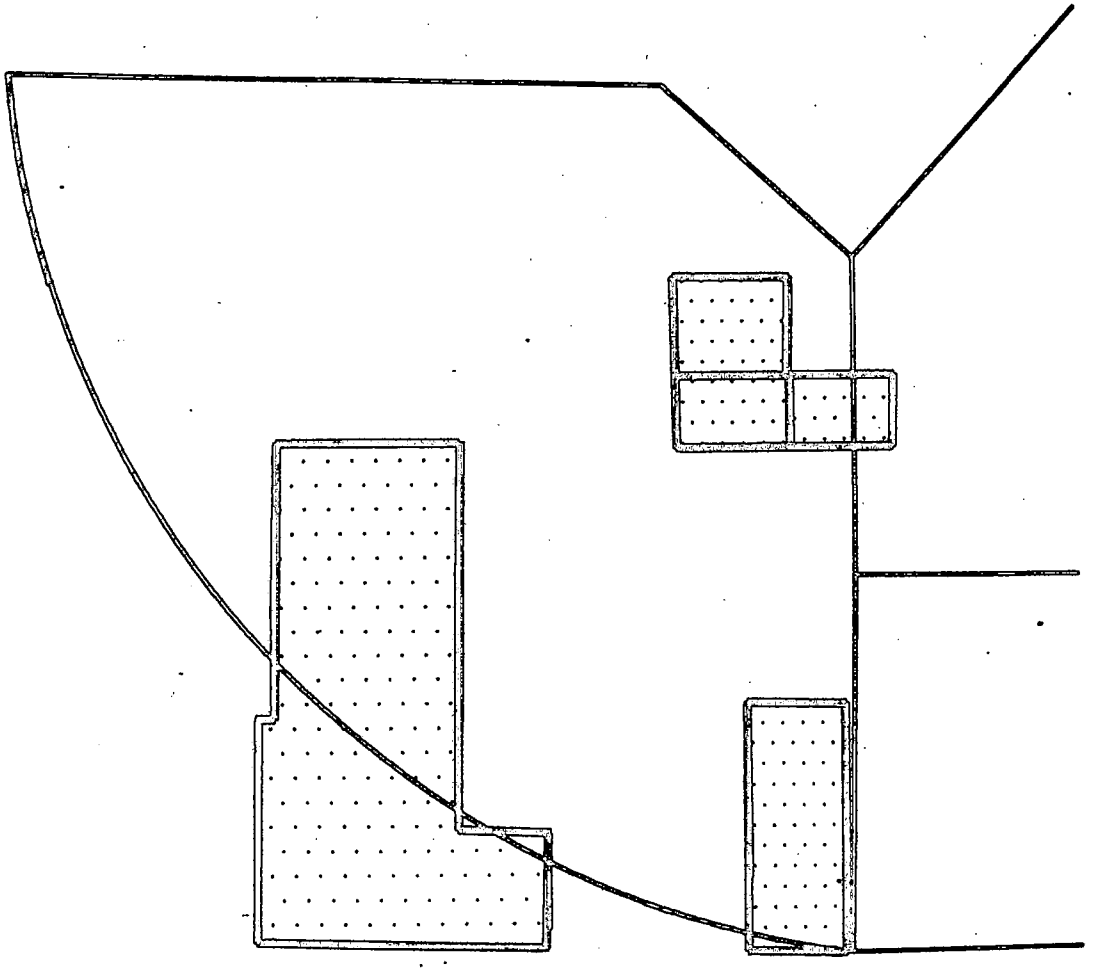

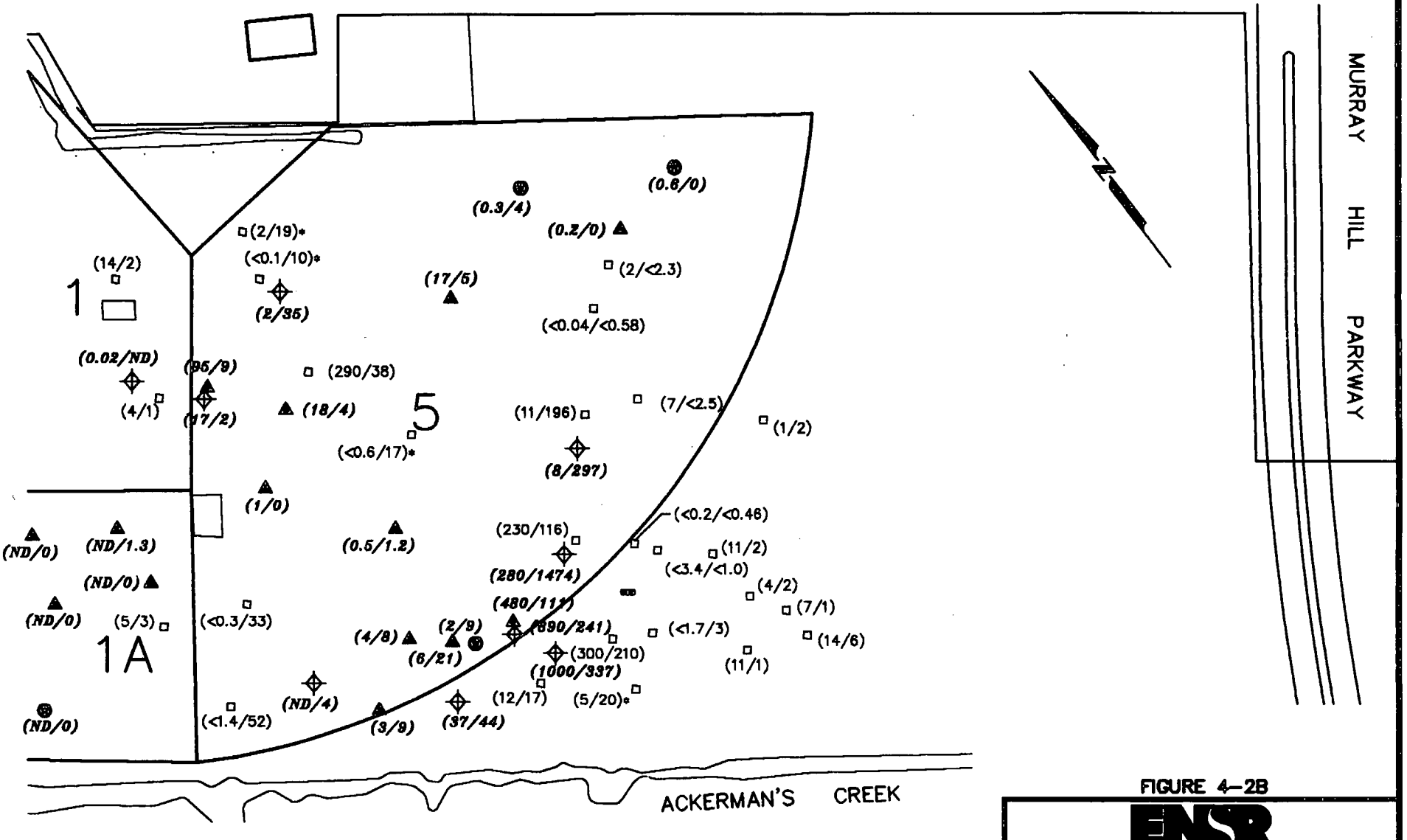

FIGURE 4-2B

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PCB/PAH REMEDIATION AREAS
UOP SITE
EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	2/94	0186-002-526

018626A

PCB/cPAH concentrations exceeding the action levels are in the surface soils of Areas 1, 2, 5, and to the southeast of 5. In the FS, two small remediation areas were identified in Area 2. The results of the new sampling show that a large portion of the area contains PCBs above the action level of 2 mg/kg and one sample (P/P-6) contains concentrations above the treatment action level. The new remediation boundary is drawn to encompass all of the sample locations where the PCB concentration exceeds 2 mg/kg. On the Route 17 side, this boundary extends to the edge of Area 2. On the railroad side, the boundary extends to the railroad easement. On the other two sides the boundary is defined generally by other sample locations which lie outside of the remediation area and the PCB concentration are less than 2 mg/kg. With one exception, the soil in this remediation area will be excavated and placed under the cover in Area 5. The one exception is a small area in Area 2 which will require treatment because the concentration (400 mg/kg) exceeds 25 mg/kg.

Both samples taken in Area 1 (P/P-8 and P/P-9) contained PCB concentrations above the action level for covering and below the action level for treatment. Therefore the remediation area is extended to include the soil surrounding these samples. This soil will be excavated and placed under the cover in Area 5.

The sample collected in Area 1A contained PCBs and cPAHs below the action level for covering. This result along with previous data show that the remediation area need not extend into Area 1A.

The soil samples collected within and to the south of Area 5 mostly had PCB concentrations in the 2-25 mg/kg range. Based on these data, the treatment area was reduced slightly. However, because the limit of PCB concentrations exceeding 2 mg/kg was not found, the soil cover was expanded to Murray Hill Parkway.

Three soil samples collected in Area 5 (P/P-11, P/P-12, P/P-14) contained levels of PCB/cPAH above the treatment action level in locations not previously identified for treatment. The areas surrounding these samples were included in the excavation and treatment remediation area.

4.4 VOC in Soil

The VOC remediation areas include surface and subsurface soils in areas 1A and 2. The action level for total VOC contained in surface and subsurface soil is 1000 mg/kg. The recommended remedial alternative in the FS for VOC soils is vapor extraction. For thermal desorption the soil will be excavated, treated, and then backfilled on site. This alternative has been replaced by the selected alternative in the ROD which is thermal desorption of the VOC soils.

Figure 4-3 presents the remediation areas for the soils containing VOCs. Based on these areas, an estimated 9,400 cubic yards of soil will be treated.

All the new soil samples collected in Area 2 are below the 1000 mg/kg action level. Based on the new information, the remediation area was appropriately delineated in the FS and the area will not be changed.

Only one soil sample (V-5) collected in Area 1A contains VOCs above the action level. Therefore the remediation area was increased to include the soil surrounding V-5. The southwest boundary was moved in to reflect the low concentration on that side.

4.5 VOC in Ground Water

As evaluated in the FS, groundwater that exceeds the remediation goal extends throughout much of Areas 1 and 1A and a small portion of Area 2. The action level for VOC in groundwater is 1 mg/l for an individual VOC and 10 mg/l for total VOCs.

Figure 4-4 shows the remediation areas for VOC in groundwater. The new groundwater samples in Area 2 all had concentrations below the action levels. Therefore the remediation area shown in the FS was reduced to reflect the new data.

The new groundwater samples in Areas 1 and 1A confirm previous results. The one sample within the remediation area was above the action limit while the other samples, outside of the remediation area, were all below the action level. Based on the new well in the southern portion of Area 1A, the remediation area in that location was reduced slightly. It should be noted that the volume of groundwater requiring treatment and the cost associated is not expected to change significantly.

4.6 Comparison of Revised Remediation Quantities to FS

Table 4-2 is a comparison of the remediation areas and volumes calculated in the FS and this evaluation. Since the cover for both the lead and PCB/cPAH remediation areas have been extended to Murray Hill Parkway, the covers have doubled in size. The volume of soil requiring treatment (PCB/cPAH & VOC) has also increased. As discussed in the previous section, the volume of ground water requiring treatment is not expected to change significantly.

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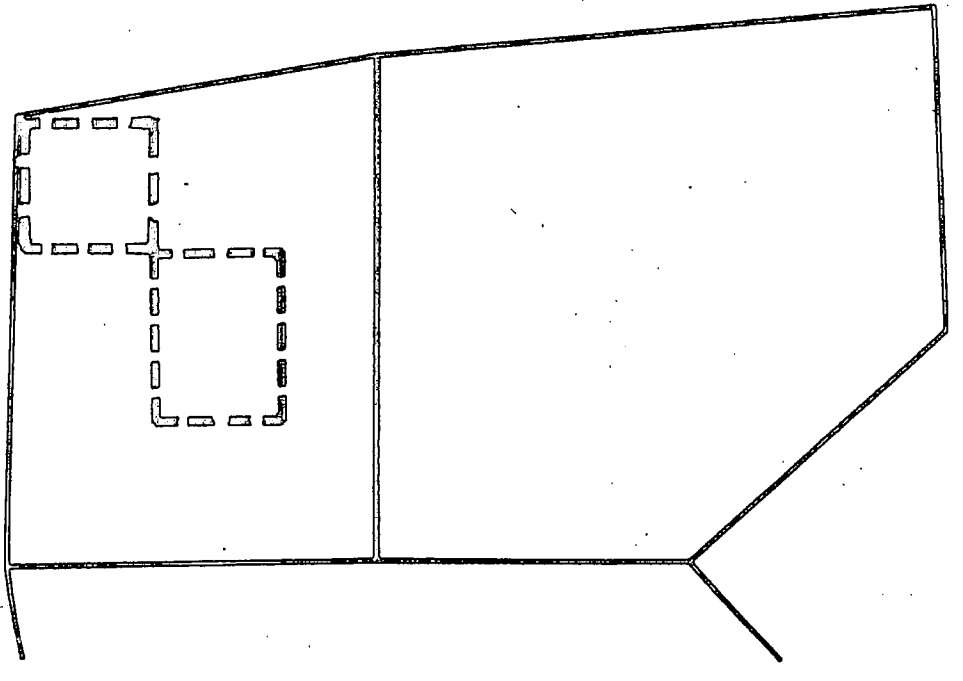

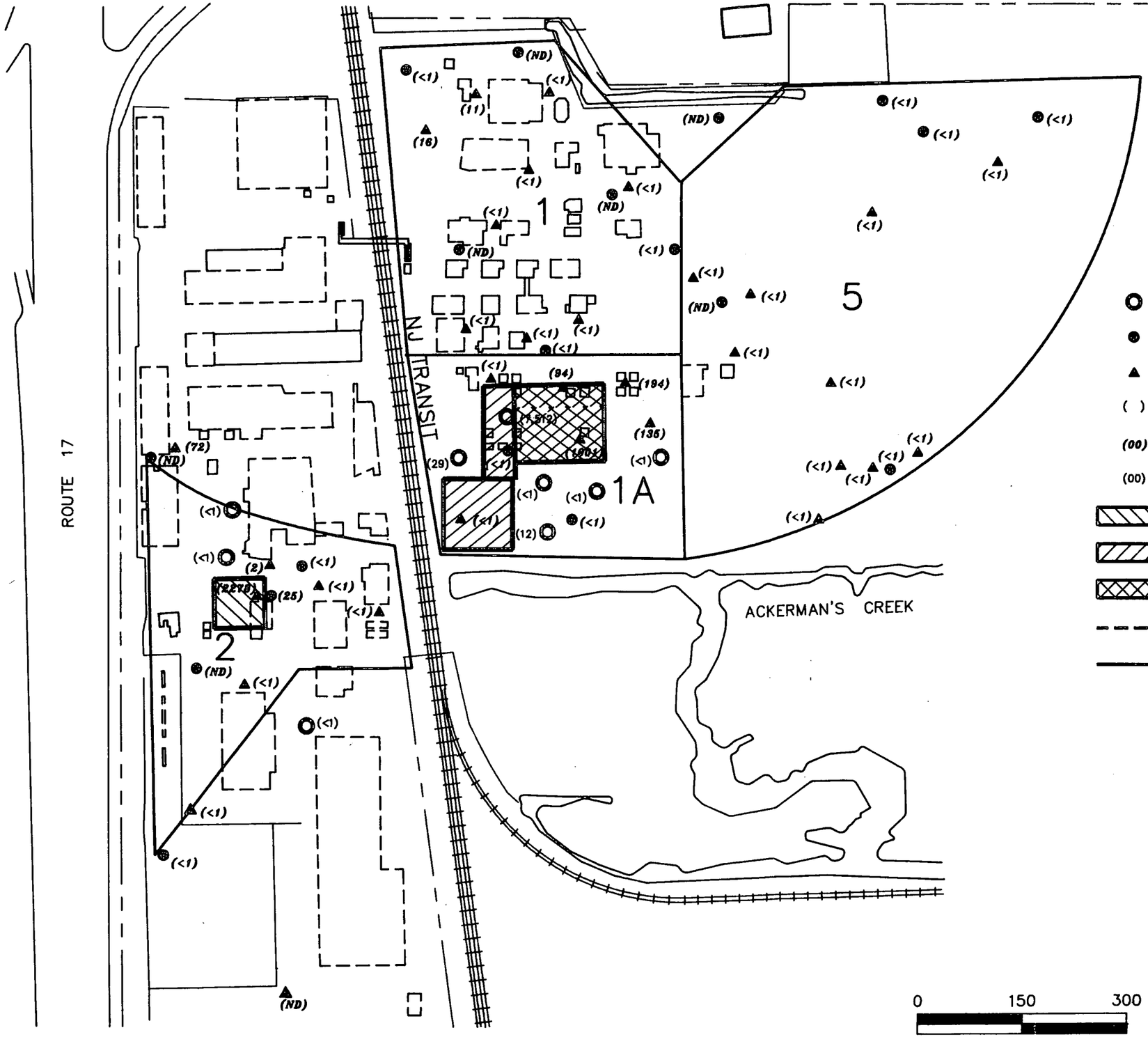

LEGEND

- NEW VOC SOIL SAMPLING LOCATIONS
- SURVEYED EXISTING MONITORING WELL LOCATIONS
- SOIL BORING LOCATION
- ( ) CONCENTRATIONS IN mg/kg
- (00) OLD CONCENTRATIONS PER 1992 FEASIBILITY STUDY
- (00) NEW CONCENTRATIONS
- SURFACE SOIL
- SUBSURFACE SOIL
- SURFACE & SUBSURFACE SOIL
- REMEDIATION AREA 1992 FS
- NEW REMEDIATION AREA

NOTES

ONLY SURFACE SOIL CONCENTRATIONS ARE SHOWN.

ACTION LEVEL FOR VOC IS 1000 mg/kg

0 150 300

SCALE IN FEET
1" = 150'

FIGURE 4-3

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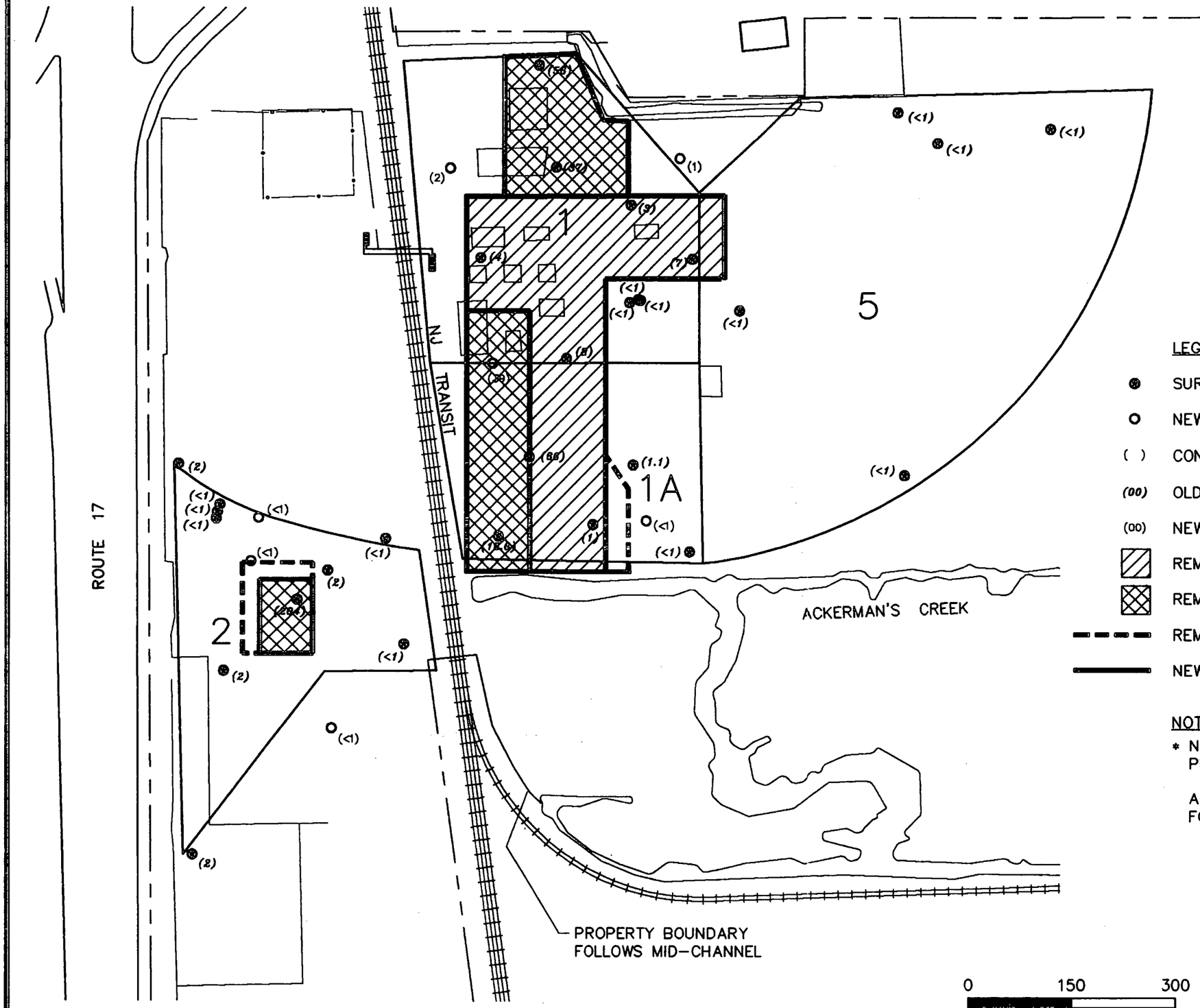
VOC REMEDIATION AREAS UOP SITE EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	3/93	0186-002-525

01861198



LEGEND

- ⊛ SURVEYED EXISTING MONITORING WELL LOCATIONS
- O NEW MONITORING WELLS
- ( ) CONCENTRATION IN mg/l
- (00) OLD VOC CONCENTRATIONS PER 1992 FEASIBILITY STUDY
- (00) NEW VOC CONCENTRATION
- REMEDIATION AREA, INDIVIDUAL VOC >1mg/l
- REMEDIATION AREA, TOTAL VOC >10mg/l
- REMEDIATION AREA 1992 FS
- NEW REMEDIATION AREA

NOTES:

* NOT FOUND IN FIELD; LOCATION PLOTTED FROM PREVIOUS MAPS

ACTION LEVEL FOR TOTAL VOC's IS 10 mg/l & FOR INDIVIDUAL VOC's 1 mg/l

FIGURE 4-4

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GROUNDWATER REMEDIATION AREAS UOP SITE EAST RUTHERFORD, N.J.

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	2/94	0186-002-526

0186117B

TABLE 4-2

Comparison of Areas & Volumes

Remediation Area	1992 Volumes, Feasibility Study	1993 Adjusted Volumes Based on Supplemental Investigation
PCB & PAH Soil Cover Area	210,000 square feet or 4.8 acres	435,000 square feet or 10 acres
PCB & PAH Soil Excavation Quantity	6800 cubic yards	8150 cubic yards treated soil 9600 cubic yards soil from Areas 1 and 2 will be placed under the Area 5 cover.
VOC Soil Excavation Quantity	7,200 cubic yards	9,400 cubic yards
Lead Soil Cap Area	160,000 square feet or 3.7 acres	320,000 square feet or 7.3 acres
Groundwater Remediation Volume	13.9 million gallons	13.9 million gallons

4.7 Comparison of Revised Cost Estimates to FS

Table 4-3 is a comparison of the remediation costs calculated in the FS and this evaluation. The total estimated cost for remediation has increased from $9,130,000 to $11,360,000.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Use of Field Screening Methods

PCBs

As described in Section 3, the ENSYS PCB field test kit analysis was performed on ten samples and compared to the results of laboratory analyses performed by EPA Method SW-846, 8080. The test kit result is not a specific concentration but an indication of whether or not the sample is above or below the known concentration of a standard. Each sample was compared to two standards: one at 25 ppm and the other at 2 ppm. Therefore each sample result was reported to be in one of three ranges: <2 ppm, 2-25 ppm, and >25 ppm. Nine of the ten laboratory results fell within the reported range of the test kit results. For the tenth sample, the test kit predicted a concentration of exactly 2 ppm, while the laboratory result was non detect (DL=0.2 ppm). This minor difference could easily be caused by sample non-homogeneity.

Based on the very positive results of the testing program, it is recommended the ENSYS Test Kit be used during the remedial action program as an excavation verification tool. Sometimes, when using a field test kit, the standards are set below the action limit as a contingency against inaccuracies in the method. For example, if the action level is 2 ppm, the standard may be set at 1 ppm. If the sample result is predicted to below the 1 ppm standard, then there is added confidence in assuming that the actual result, accounting for inaccuracies of the method, is below 2 ppm. Based on the excellent results of this test program it is recommended that lowering of the standards is not necessary. Based on this recommendation, the standards will be set at the PCB action levels for the UOP Site remediation: 2 ppm for covering and 25 ppm for treatment.

One item of caution should be observed when using the test kit. The test kit analyses are performed on a wet weight basis while the laboratory results are adjusted to a dry weight basis. The results compared well in spite of this discrepancy. Some of the samples contained over 80% moisture by weight. This is good news for using the test kit; however, it is recommended that in the future, the test kit be used as much as possible during dry conditions.

cPAH

Thirty-one samples were analyzed by both the SIM screening method and the SW-846, 8270 laboratory method. The results compare well for 20 of the 31 samples; however, there are large discrepancies in the remaining 11 samples. Neither method is consistently higher, nor is there

any pattern for the differences. The screening method has compared much more favorably at other sites. The cause of the discrepancy at the UOP Site is not known.

The number of samples where the results do not agree well is too high to recommend the use of the cPAH screening method during the UOP Site remediation. This unfortunate result may also impact the use of the PCB screening method. In Area 5, there is a remediation area identified for the presence of both PCBs and cPAHs. Therefore, samples collected from that area must be analyzed for both sets of constituents. For remediation verification samples that are analyzed for both, it may be more prudent to send the sample to the laboratory for both analyses rather than performing the screening method on site.

In Area 2, cPAHs are not identified for remediation. Therefore, PCB analyses could be performed by the screening method.

VOCs

The results of GC screening and laboratory results in soil compared favorably, with some notable exceptions. First, 1,1,2,2-tetrachloroethane was added as a compound with a specific action level (20 ppm), late in the program. Consequently, the field GC did not have a lamp that was sensitive to this compound. In one sample (V-5), the 1,1,2,2-tetrachloroethane concentration reported by the laboratory was very high (6,400 mg/kg). Not only did the screening method not detect this compound, but other VOCs in the sample are believed to have been suppressed by its presence. For future analyses it is recommended that a higher energy lamp and standards for 1,1,2,2-tetrachloroethane be used. Had these measures been used during this program, the 1,1,2,2-tetrachloroethane would have been detected. Its concentration was so high that remediation would have been triggered regardless of whether or not the other compounds were suppressed. In future samples where this compound is present but not at as high a concentration, the results for other compounds are likely to be more accurate because the suppression factor will not be as significant.

In two soil samples, (V-4 and V-7), the screening results were considerably higher for benzene and toluene than the laboratory results. It is believed that some volatilization of these compounds was experienced during transportation to and handling at the laboratory. Therefore, the field screening result is believed to be more accurate, and conservative.

The results of the two techniques in groundwater agreed very well; each technique provided a consistent answer as to whether or not the sample contained a concentration for an individual compound of greater that 1 mg/l. Because 1,1,2,2-tetrachloroethane was found at significant

concentrations in one of the samples, the adjustments should be made to add this compound to the indicator list, i.e. use a higher energy lamp and incorporate standards.

In summary, the screening method is an effective technique for VOC analysis in both soil and groundwater, if the necessary adjustments are made to include 1,1,2,2-tetrachloroethane. An initial trial at the beginning of remediation may be necessary to test the efficacy of these adjustments.

With regard to soil analysis, it should be noted that the analysis is performed without adjustment for moisture content. Because VOCs are generally more soluble in water than other compounds, such as PCBs that are routinely reported on a dry weight basis, the reporting of VOC results on a wet weight basis is more defendable. Therefore, it is proposed to not change the procedure.

Finally, a note regarding BNA analyses in groundwater. These analyses were required to determine if organic compounds in this range exceeded the 1 mg/l criterion. Without exception, these compounds were not detected above the action limit, even in samples where the VOC concentrations were high. Therefore, it is recommended that sampling for BNAs be performed significantly less frequent than sampling for VOCs. The frequency of groundwater treatment system influent and effluent analysis will be determined during the design phase. This recommendation is consistent with the recommendation to use the VOC field screening method. Otherwise, the field screening method would not be worth doing because it is not applicable to BNAs.

Summary

The following field screening analyses are recommended for future use:

- ENSYS PCB field test kit for soil analysis
- GC screening technique for VOCs in soil and groundwater, with adjustments to incorporate 1,1,2,2-tetrachloroethane to the compound list.

The SIM screening technique for cPAHs in soil is not recommended for future use at the UOP Site.

5.2 Changes to Remediation Areas and Volumes

As reported in Section 4, there were some unanticipated results from this delineation program. The additional sampling for VOCs mostly confirmed the previously understood distribution in groundwater and soils. However, the areal distribution of lead, PCBs and cPAHs is much larger than anticipated.

Elevated lead concentrations are present as far as the sampling extends toward Murray Hill Parkway. Consequently, with no data to indicate otherwise, it is assumed that the concentrations in excess of the action level extend almost all the way to the property line at the Parkway. The concentrations along the northeastern property line are below the action level. Consequently, the soil cover or cap can be built without impinging on the neighboring property.

Similar to lead, PCB concentrations in excess of the 2 ppm action level extend all the way to the samples closest to Murray Hill Parkway. These results were in the 2 - 25 ppm range; therefore, covering will be required. The largest PCB/cPAH remediation area in Area 5 was slightly reduced in size based on the new data. Two small new treatment areas were added to Area 5: one within the original cover area, and the other outside of the remediation area altogether.

The presence of lead and PCB/cPAH in soils between Area 5 and Murray Hill Parkway raises important concerns relative to remediation in wetlands. The previously delineated remediation areas were perceived to include little or no wetlands area. Now, with the new delineation, it is quite obvious that significant wetland areas will be involved. The first step that must be performed in addressing this concern is to perform a wetlands delineation in and around the remediation areas. A plan for this delineation will follow soon after the submittal of this report to DEPE. Once approved, the wetlands will be delineated.

We anticipate that the resulting wetlands delineation will form the basis for discussions concerning the appropriate approach toward remediation in this area. These discussions may involve the Hackensack Meadowlands Development Commission, the U.S. Army Corps of Engineers, in addition to, of course, DEPE. Following these discussions it may be necessary to perform some additional PCB/cPAH delineation work in this area.

In Area 2, the distribution of PCBs in the 2 - 25 ppm range is much larger than previously believed. This larger area is reflected on the revised remediation area map in Section 4. For the first time, there is also one sample result exceeding 25 ppm, resulting in a small area requiring treatment. The remediation areas in Area 2 are now reasonably well delineated. No further pre-remediation sampling is needed in this area.

APPENDIX A

SOIL BORING LOGS
LEAD (LX)
PCBs/PAHs (P/P)
VOC (V)

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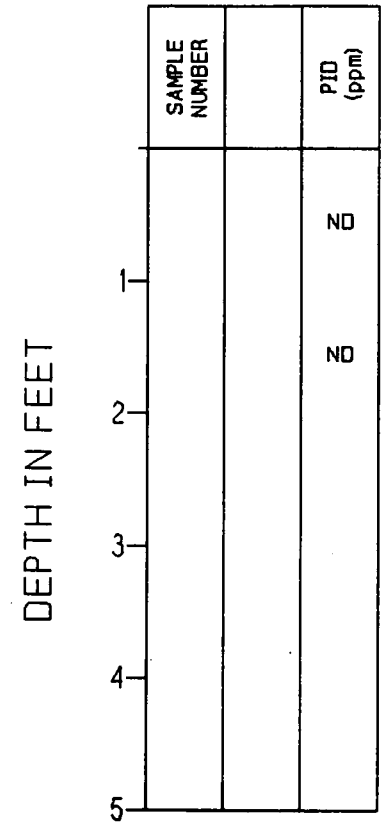
LOG OF HAND AUGER BORINGS
LX-1 AND LX-2
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING LX-1

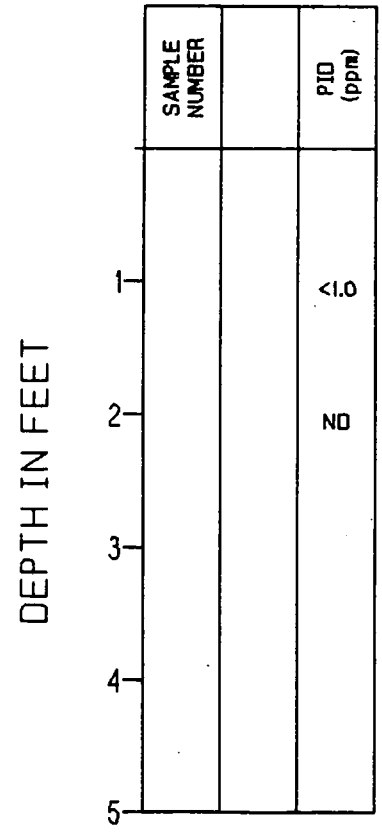
DATE DRILLED: 11/18/92



SYMBOLS	DESCRIPTION
SP	24" Recovery. 12" Dark brown, moist, coarse sand with crushed stone and organic matter.
SP	12" Gray/brown, wet, silt and fine sand with clay.

BORING LX-2

DATE DRILLED: 11/18/92



SYMBOLS	DESCRIPTION
SP	24" Recovery. 12" Gray, wet, silty sand with fill material.
SP	12" Brown, wet, silt with crushed fill material and some clay.

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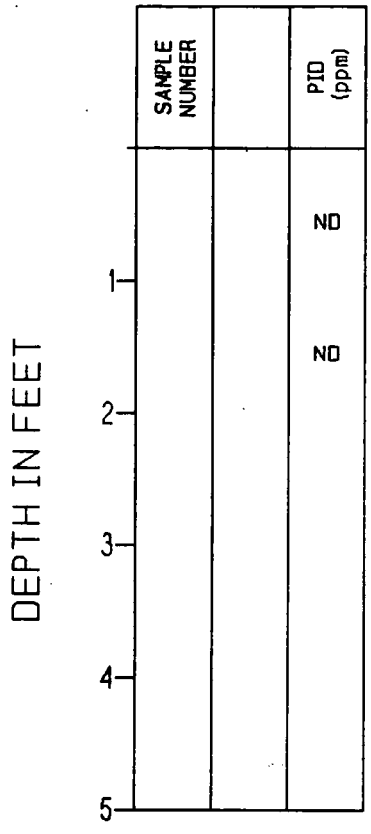
LOG OF HAND AUGER BORINGS
LX-3 AND LX-4
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING LX-3

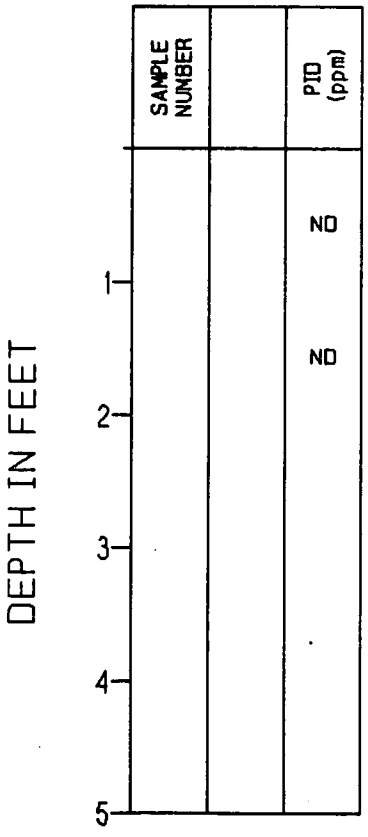
DATE DRILLED: 11/18/92



SYMBOLS		DESCRIPTION
	SP	24" Recovery. 12" Grayish-black, angular cobbles with some small gravel, organic matter, bricks, and fill material with silt.
	SP	12" Grayish-black, crushed stone, and course sand with some silt.

BORING LX-4

DATE DRILLED: 11/18/92



SYMBOLS		DESCRIPTION
	SP	18" Recovery. 18" Reddish-brown, dry, coarse sand with crushed stone and some silt.

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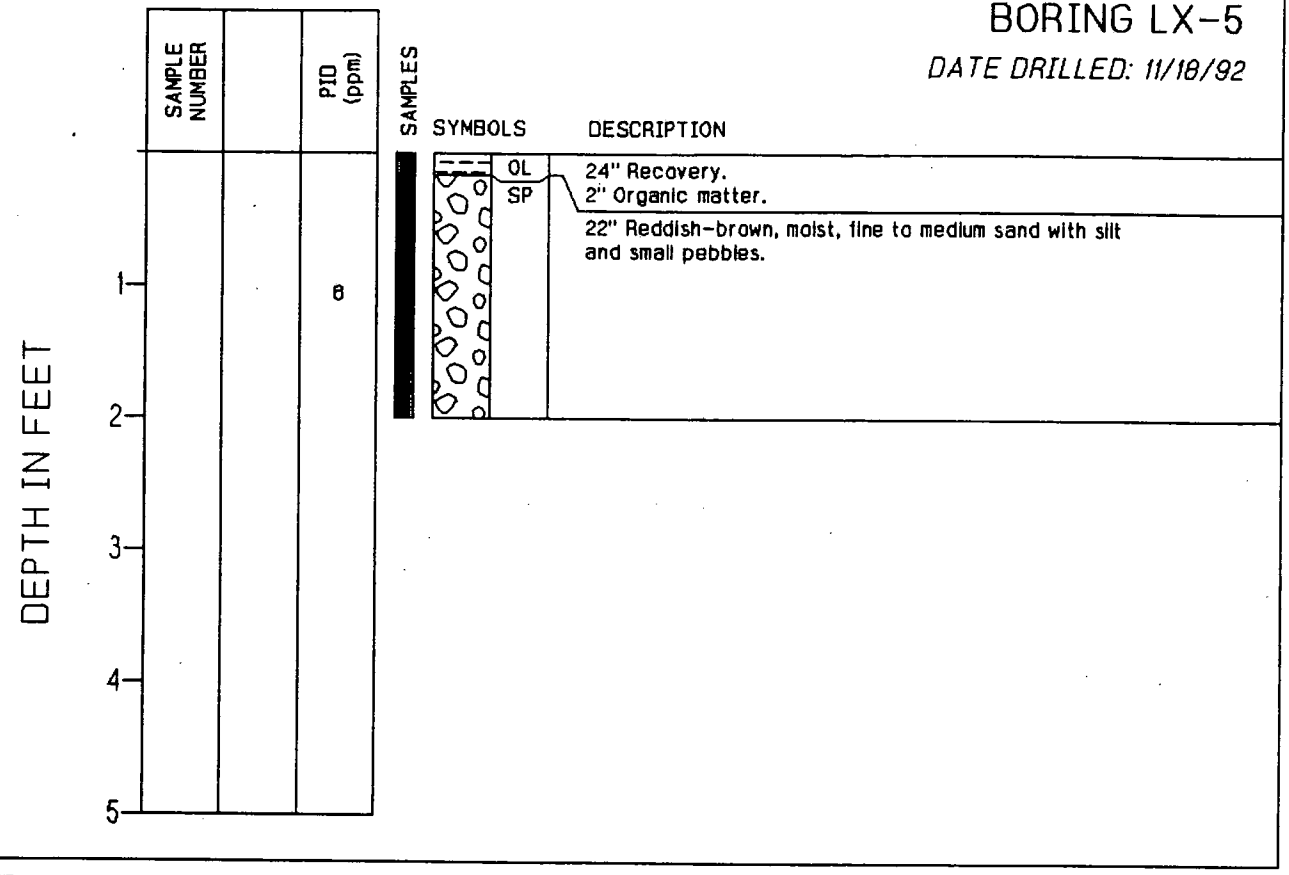
LOG OF HAND AUGER BORINGS
LX-5 AND LX-6
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

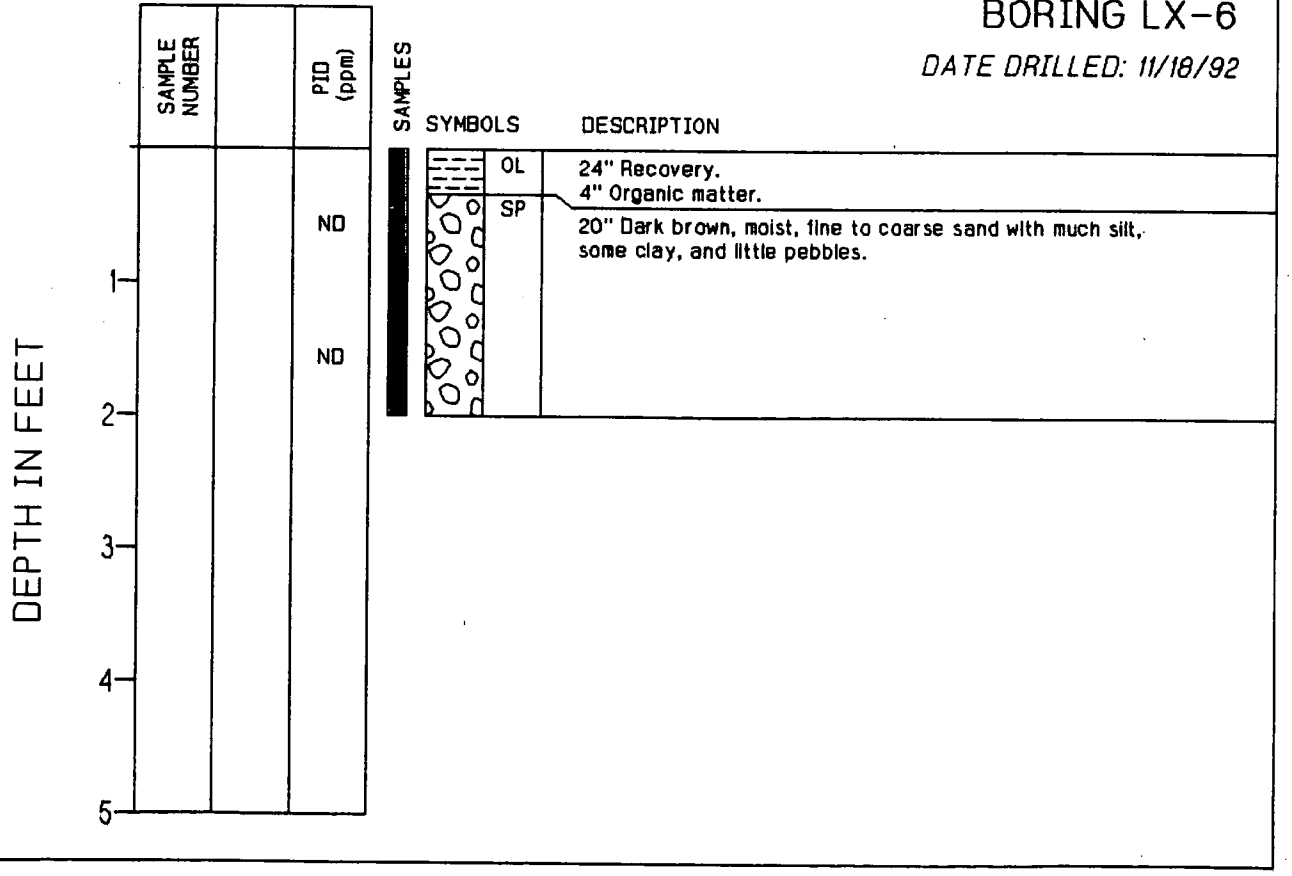
BORING LX-5

DATE DRILLED: 11/18/92



BORING LX-6

DATE DRILLED: 11/18/92



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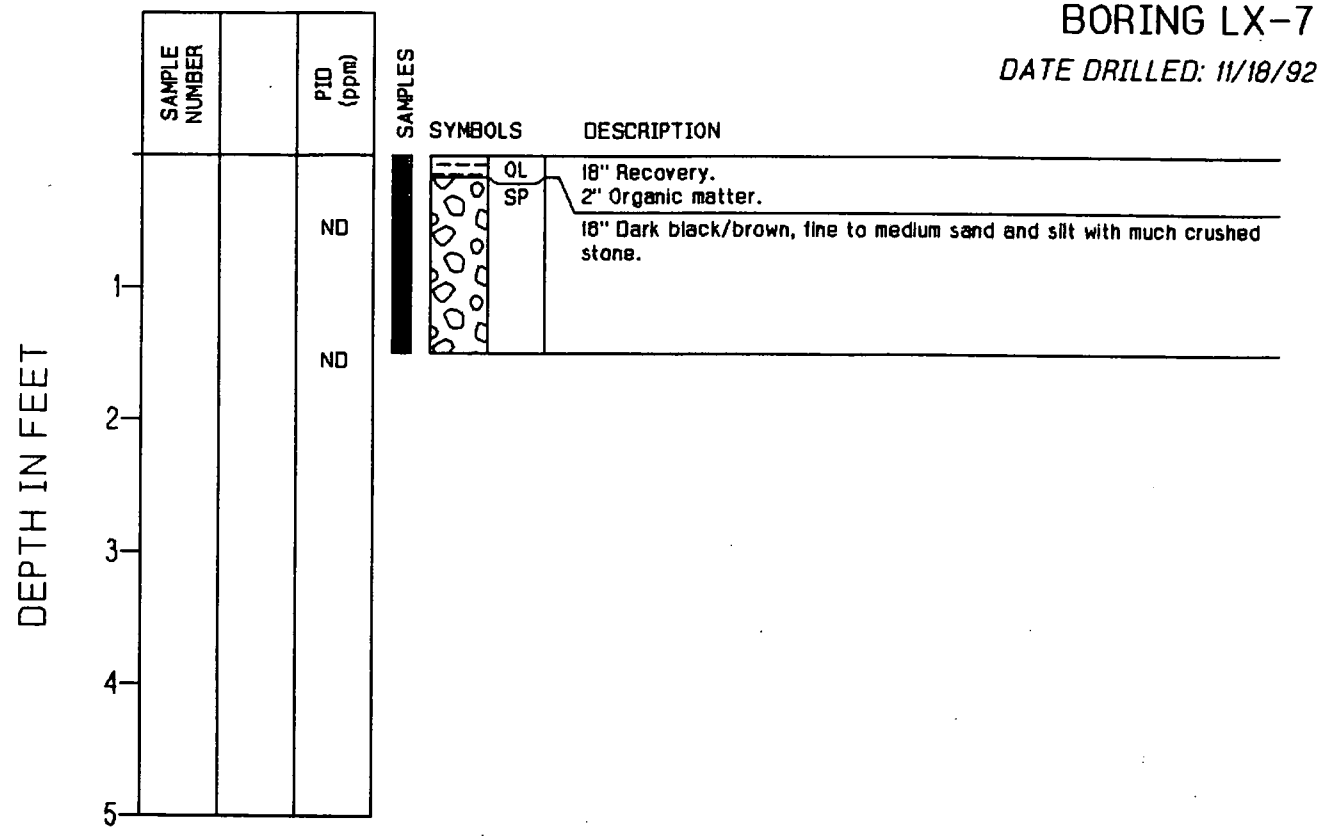
LOG OF HAND AUGER BORINGS
LX-7 AND LX-8
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

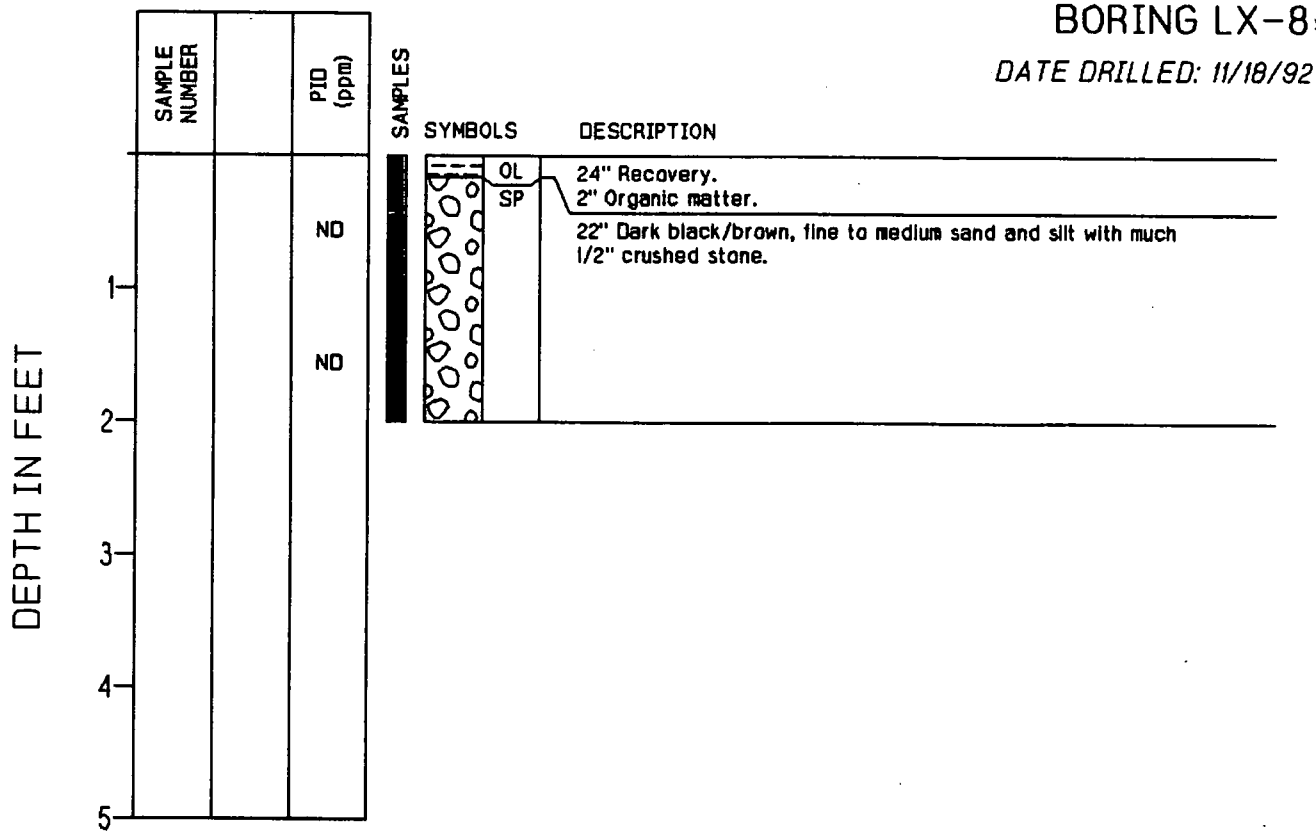
BORING LX-7

DATE DRILLED: 11/18/92



BORING LX-8

DATE DRILLED: 11/18/92



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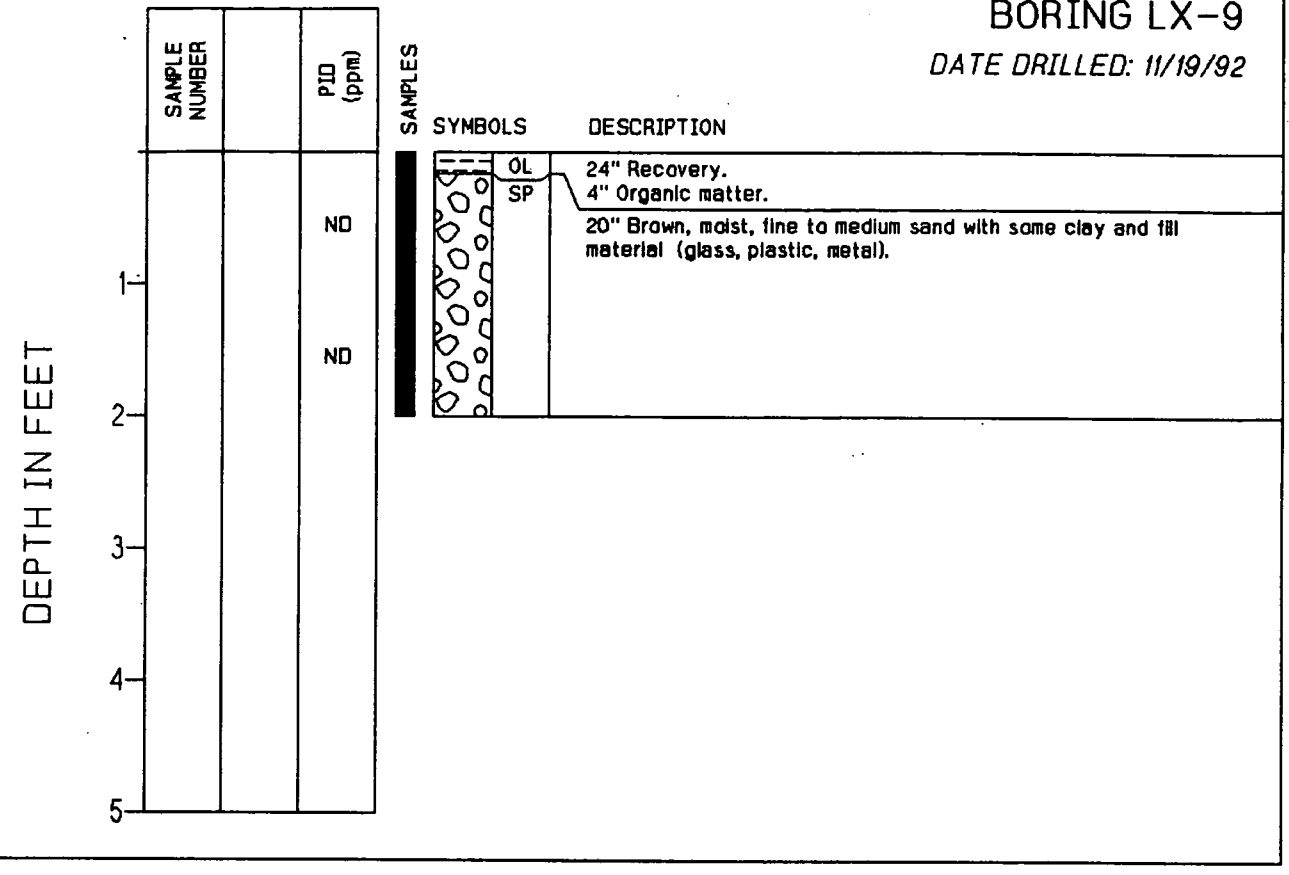
LOG OF HAND AUGER BORINGS
LX-9 AND LX-10
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER
BORINGS

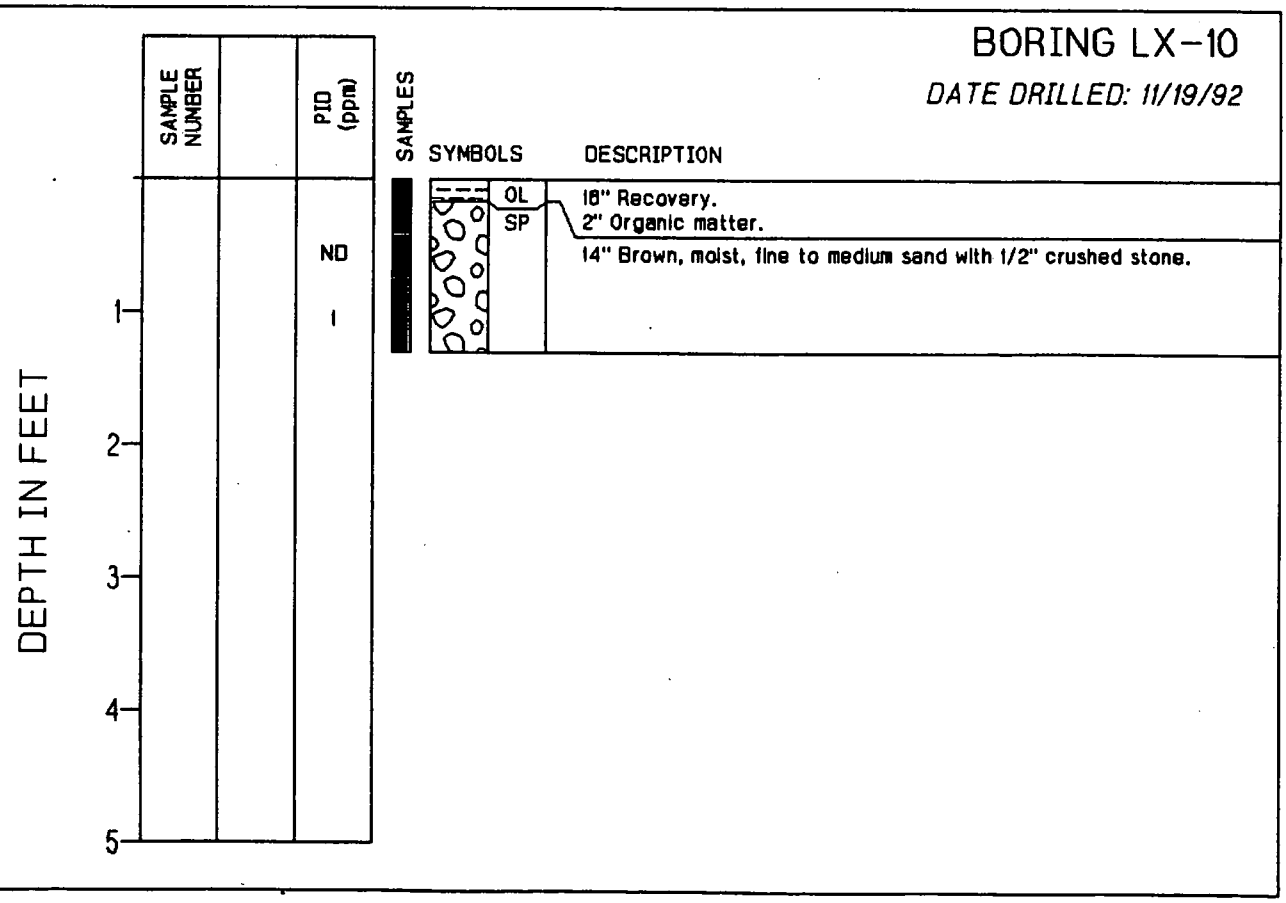
BORING LX-9

DATE DRILLED: 11/19/92



BORING LX-10

DATE DRILLED: 11/19/92



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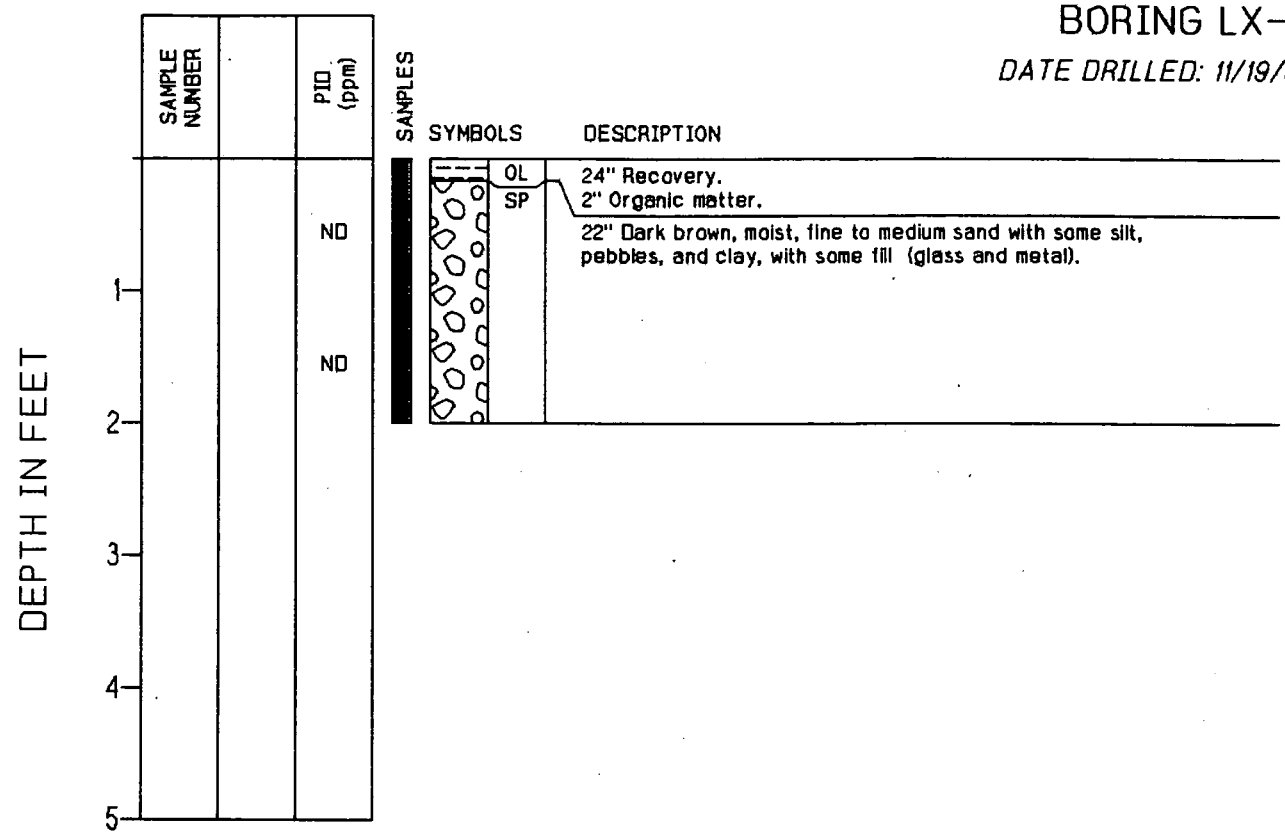
LOG OF HAND AUGER BORINGS
LX-11 AND LX-12
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

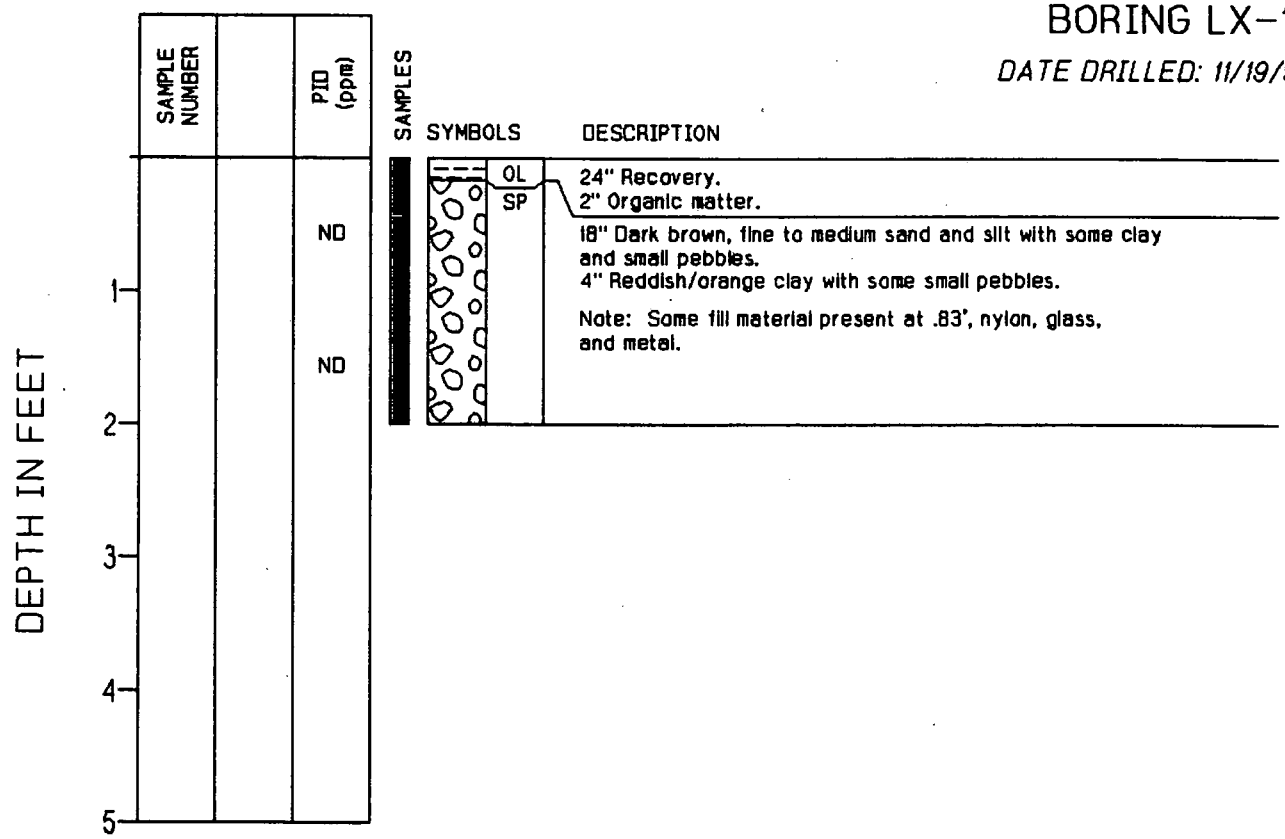
BORING LX-11

DATE DRILLED: 11/19/92



BORING LX-12

DATE DRILLED: 11/19/92



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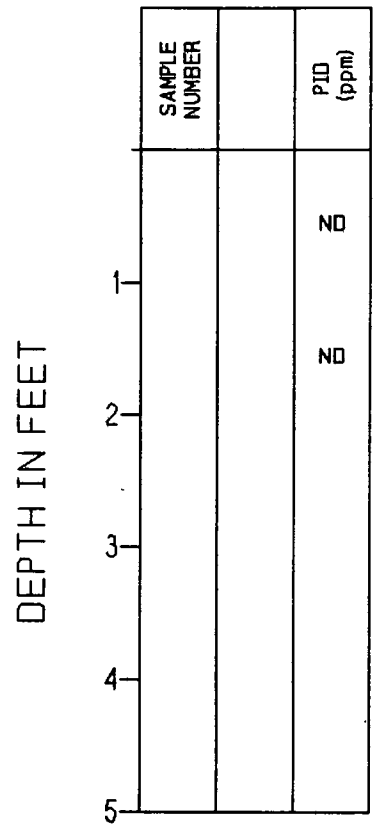
LOG OF HAND AUGER BORINGS
LX-13 AND LX-14
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

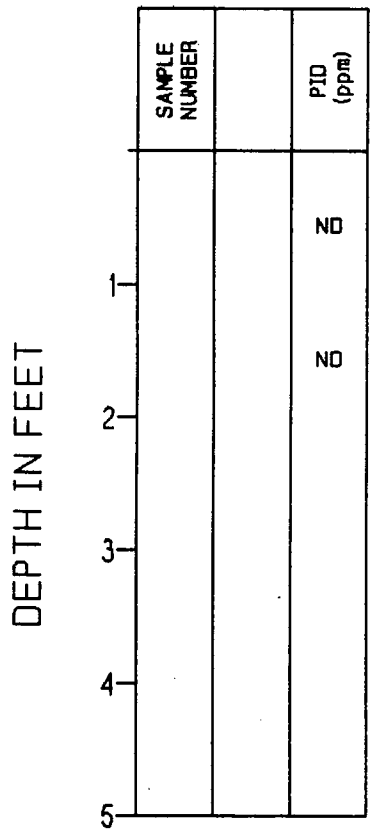
BORING LX-13

DATE DRILLED: 11/19/92



BORING LX-14

DATE DRILLED: 11/18/92



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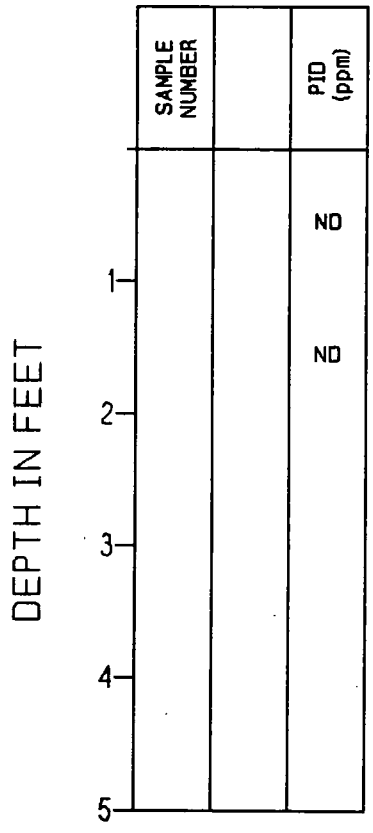
ENSR Consulting and Engineering

LOG OF HAND AUGER BORINGS
LX-15 AND LX-16
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

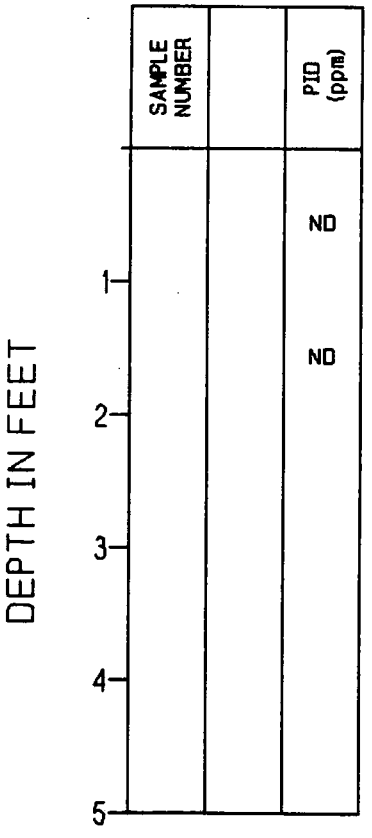
BORING LX-15

DATE DRILLED: 11/19/92



BORING LX-16

DATE DRILLED: 11/19/92



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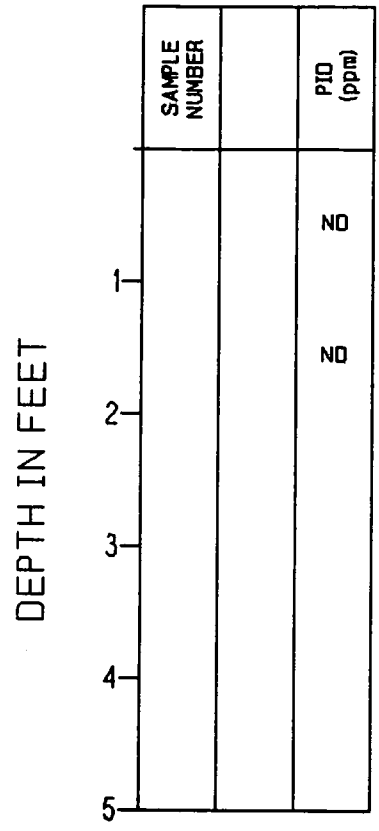
ENSR Consulting and Engineering

LOG OF HAND AUGER BORINGS
LX-17 AND LX-18
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING LX-17

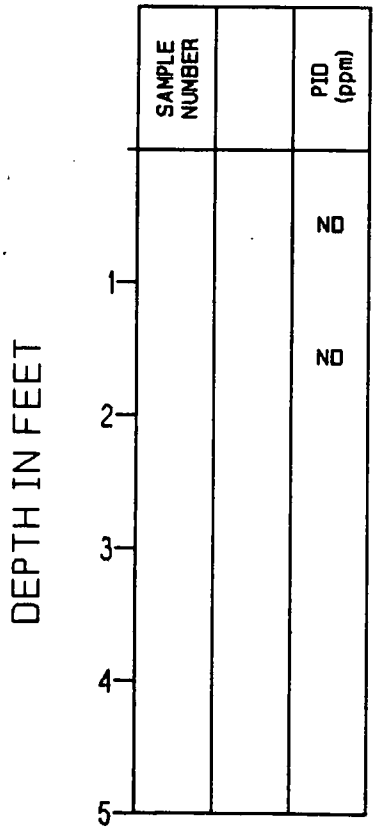
DATE DRILLED: 11/19/92



SYMBOLS	DESCRIPTION
OL / SC	24" Recovery. 2" Black, moist, organic matter.
	22" Brown, moist, fine to medium sand with red, white, brown, and gray mottles with much fill debris (glass, plastic, wood, and metal wire).

BORING LX-18

DATE DRILLED: 11/19/92



SYMBOLS	DESCRIPTION
OL / SC	24" Recovery. 2" Black, moist, organic matter.
	22" Reddish-brown, moist, silt and clay with some medium sand and much fill (bottles, glass, metal, plastic and wire). Groundwater encountered at 1.75'.

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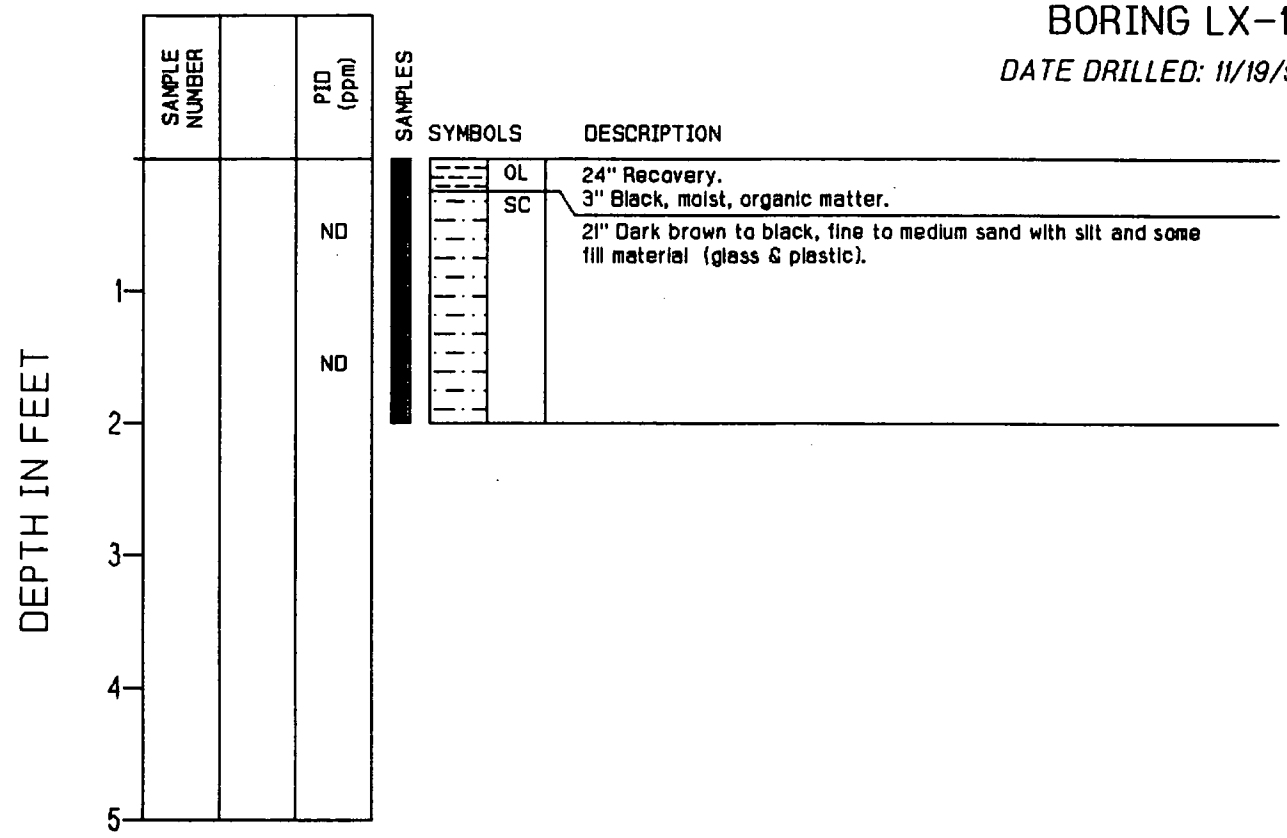
LOG OF HAND AUGER BORINGS
LX-19 AND LX-20
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING LX-19

DATE DRILLED: 11/19/92



BORING LX-20

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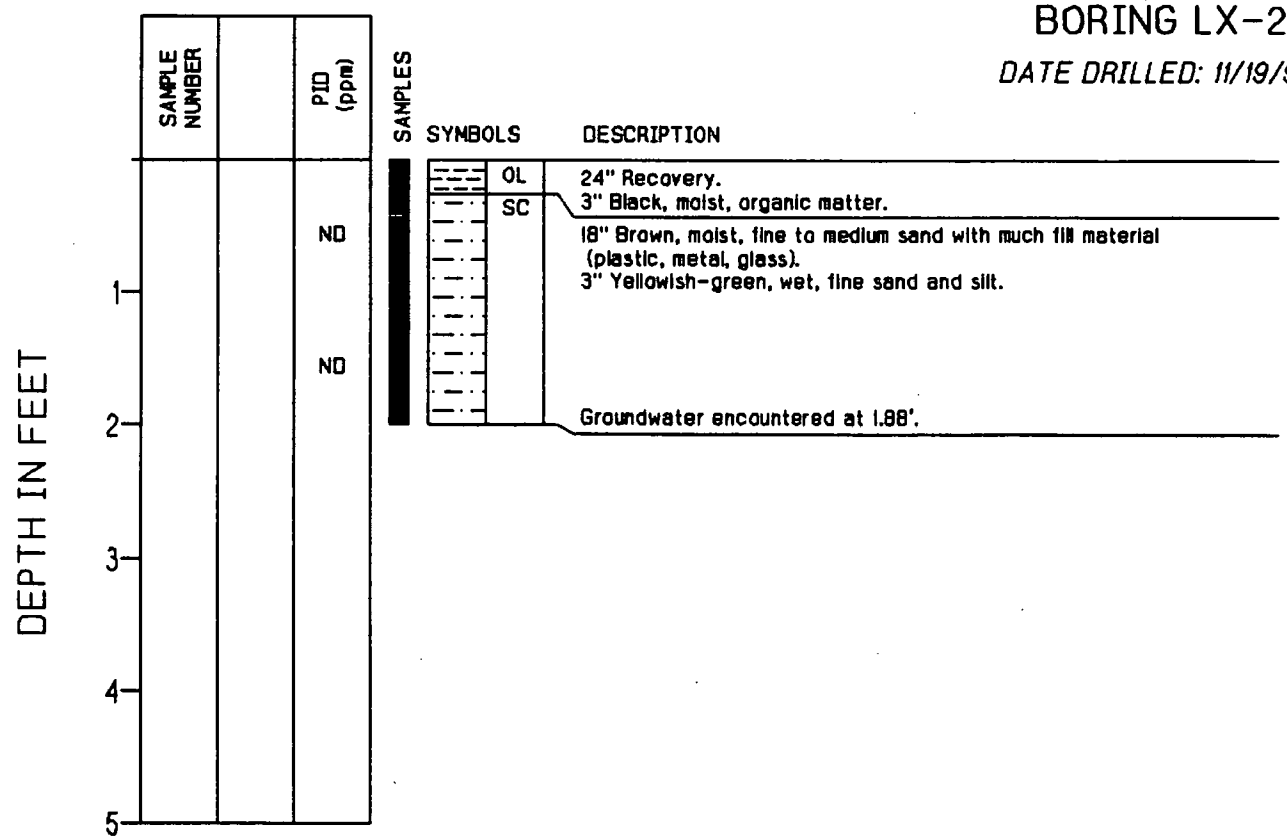

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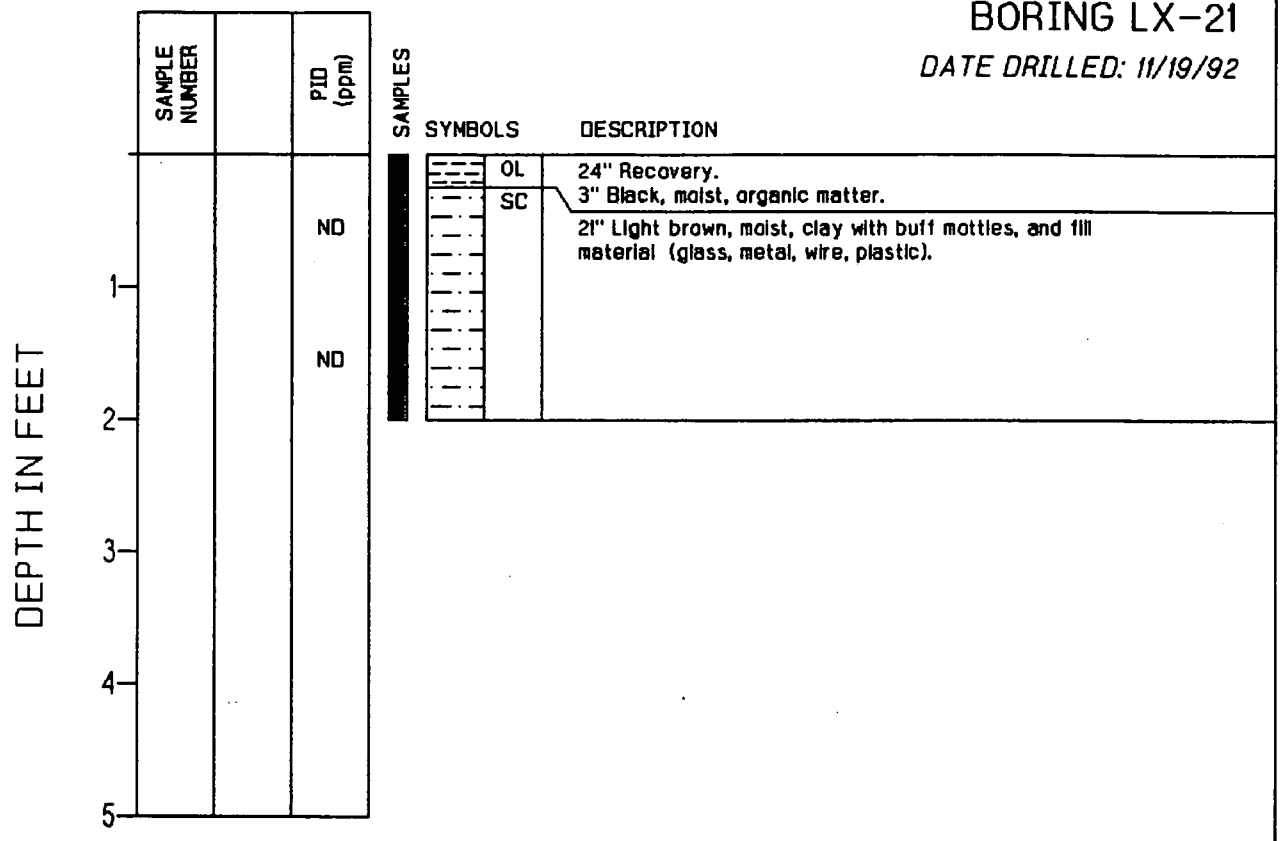
ENSR Consulting and Engineering

LOG OF HAND AUGER BORINGS
LX-21 AND LX-22
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

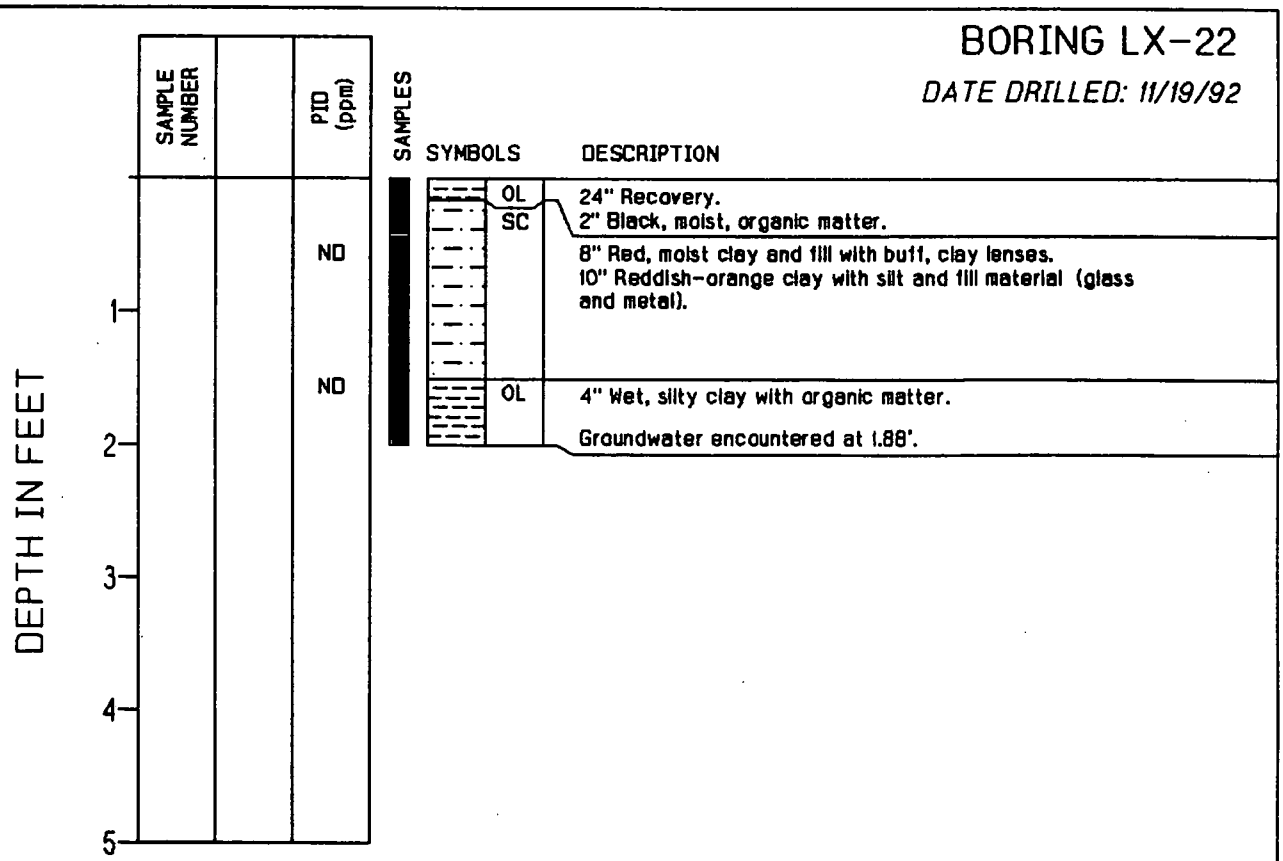
BORING LX-21

DATE DRILLED: 11/19/92



BORING LX-22

DATE DRILLED: 11/19/92



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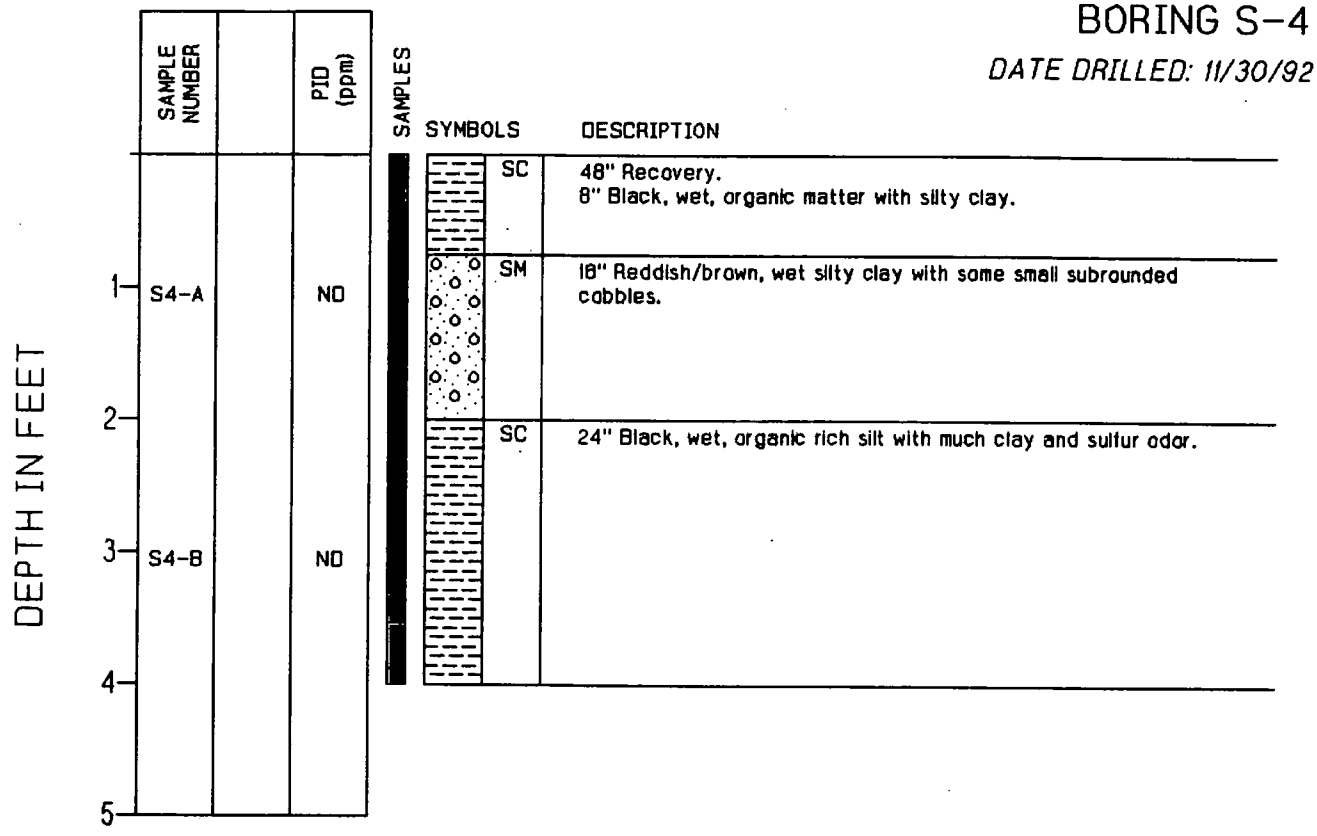
ENSR Consulting and Engineering

LOG OF HAND AUGER BORINGS
S-4 AND S-5
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

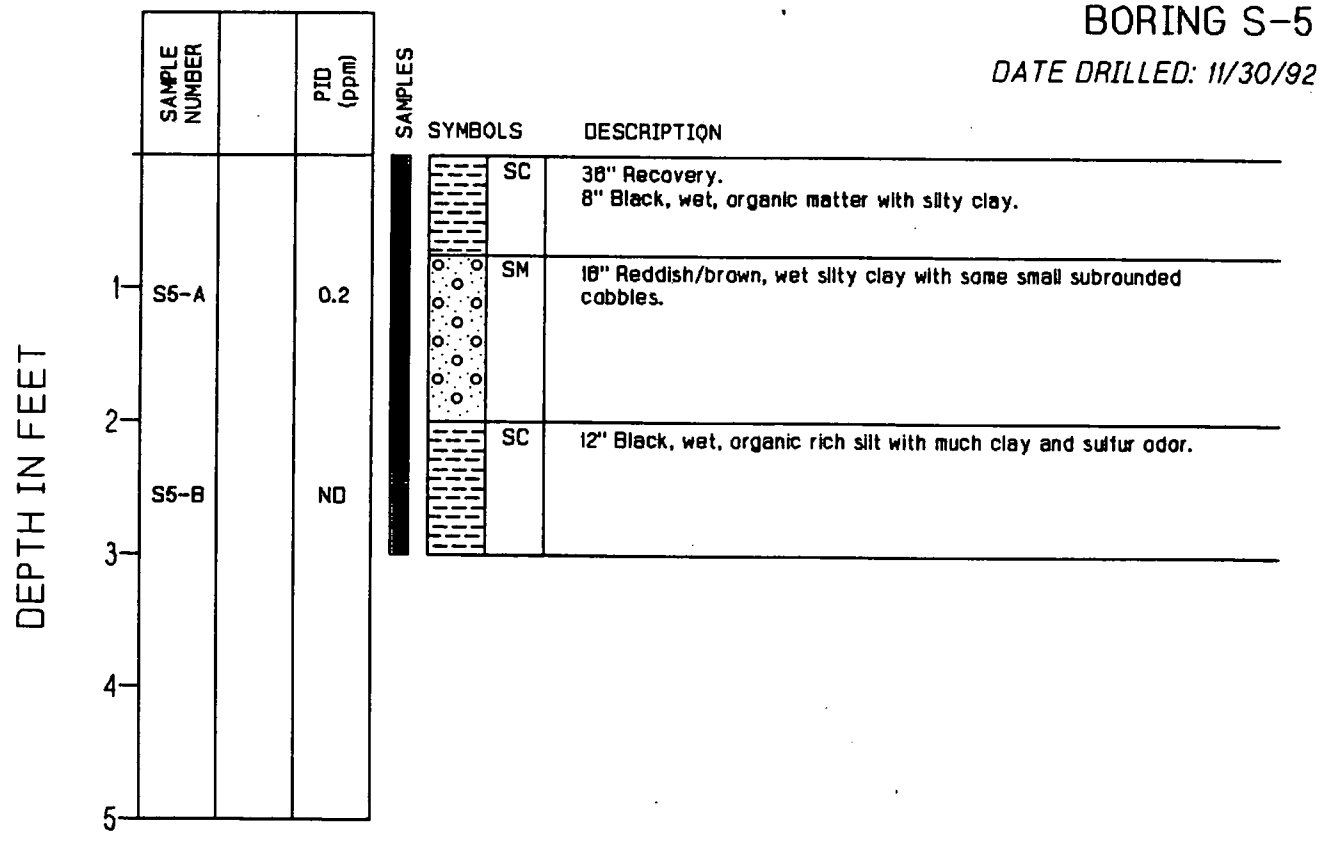
BORING S-4

DATE DRILLED: 11/30/92



BORING S-5

DATE DRILLED: 11/30/92



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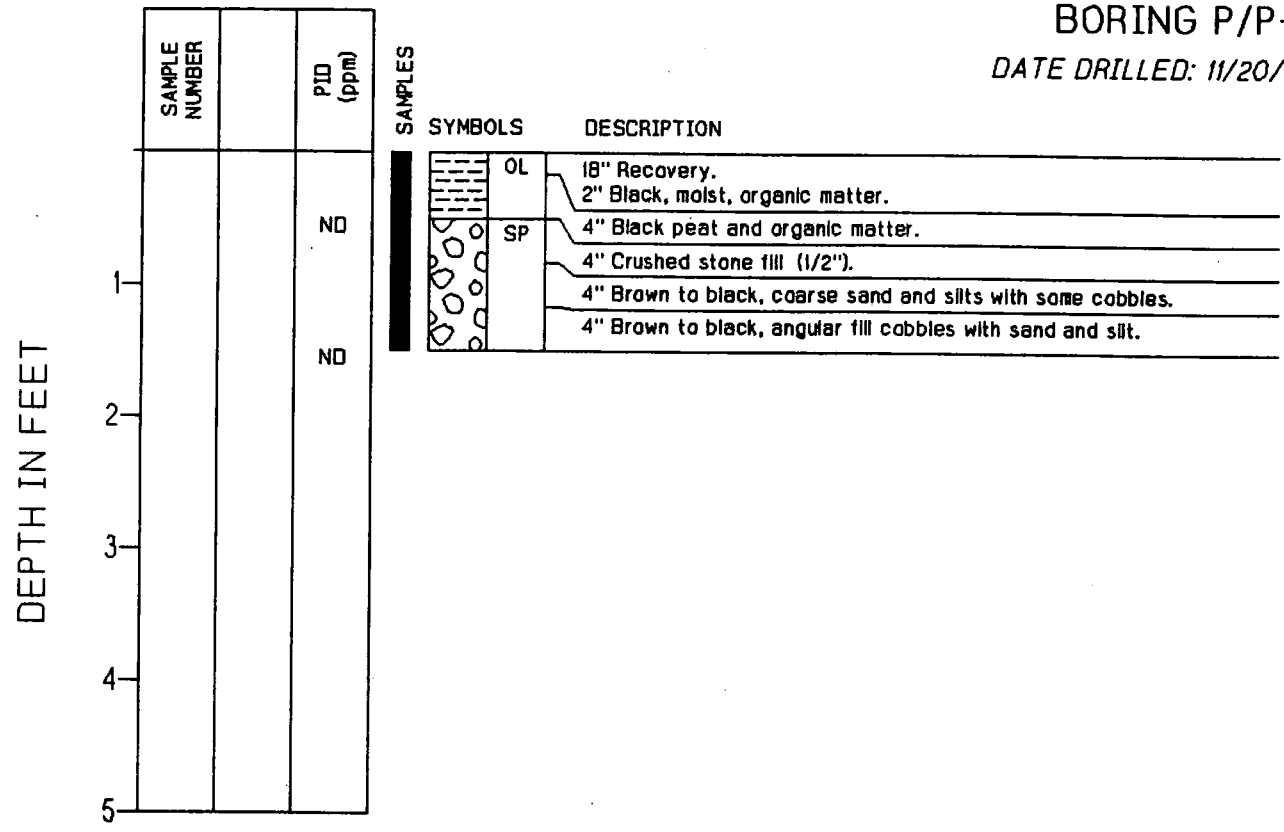
and Engineering

LOG OF HAND AUGER BORINGS
P/P-1 AND P/P-2
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER
BORINGS

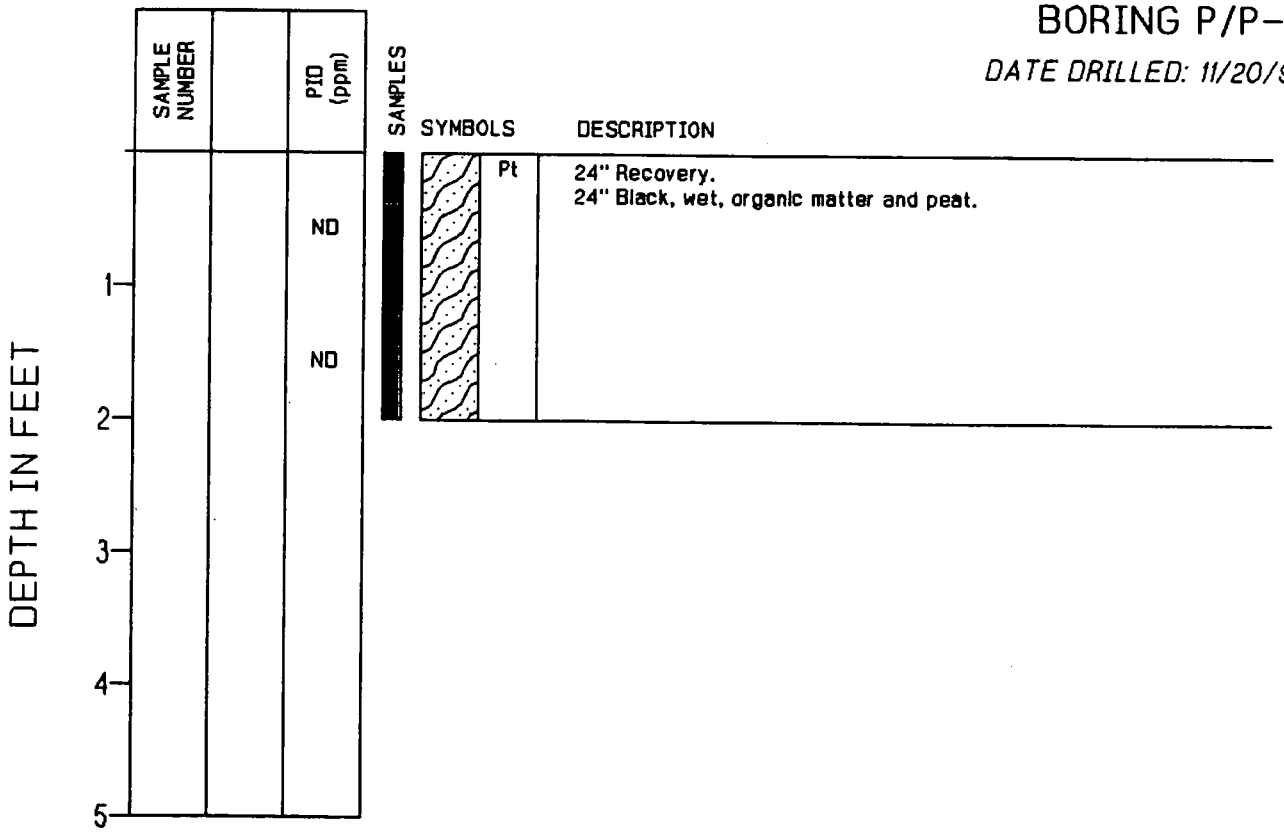
BORING P/P-1

DATE DRILLED: 11/20/92



BORING P/P-2

DATE DRILLED: 11/20/92



ENSR

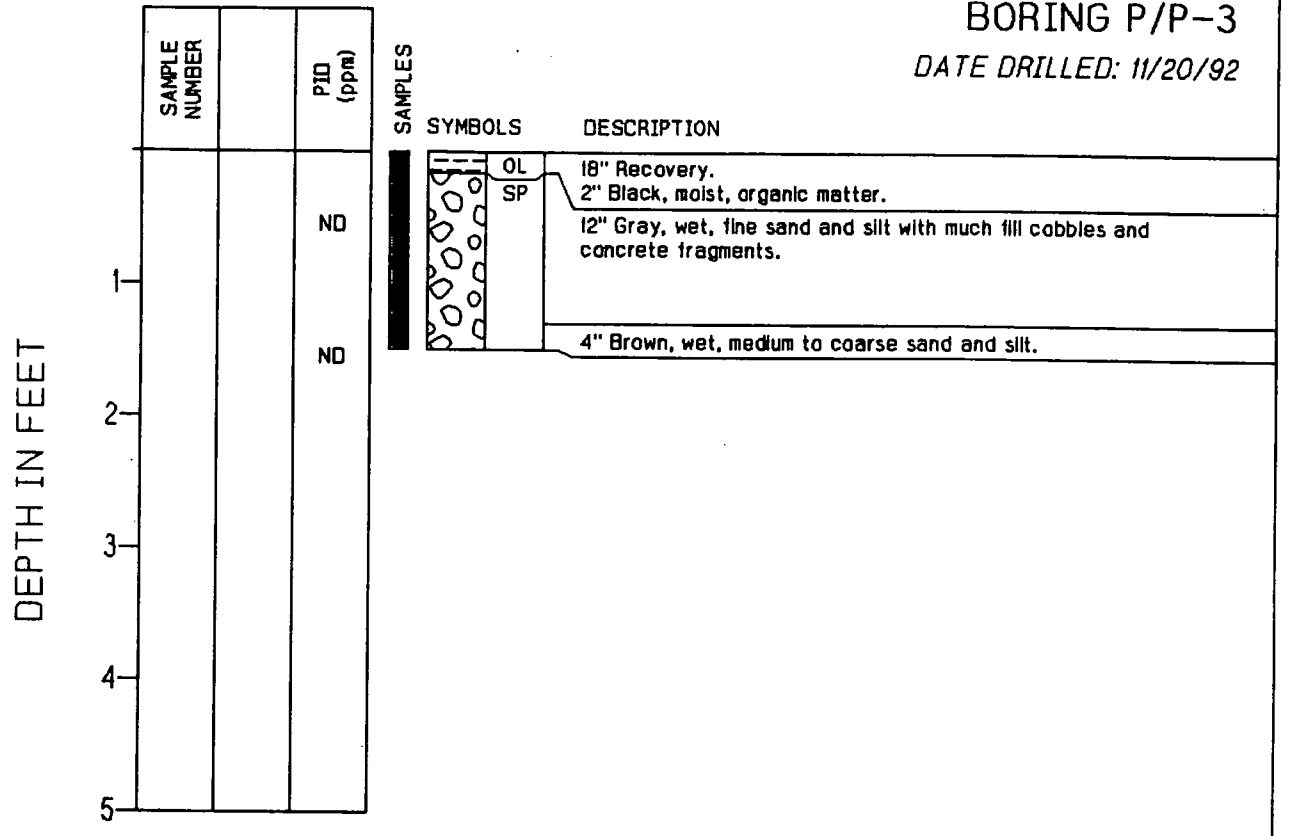
ENSR Consulting and Engineering

LOG OF HAND AUGER BORINGS
P/P-3 AND P/P-4
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

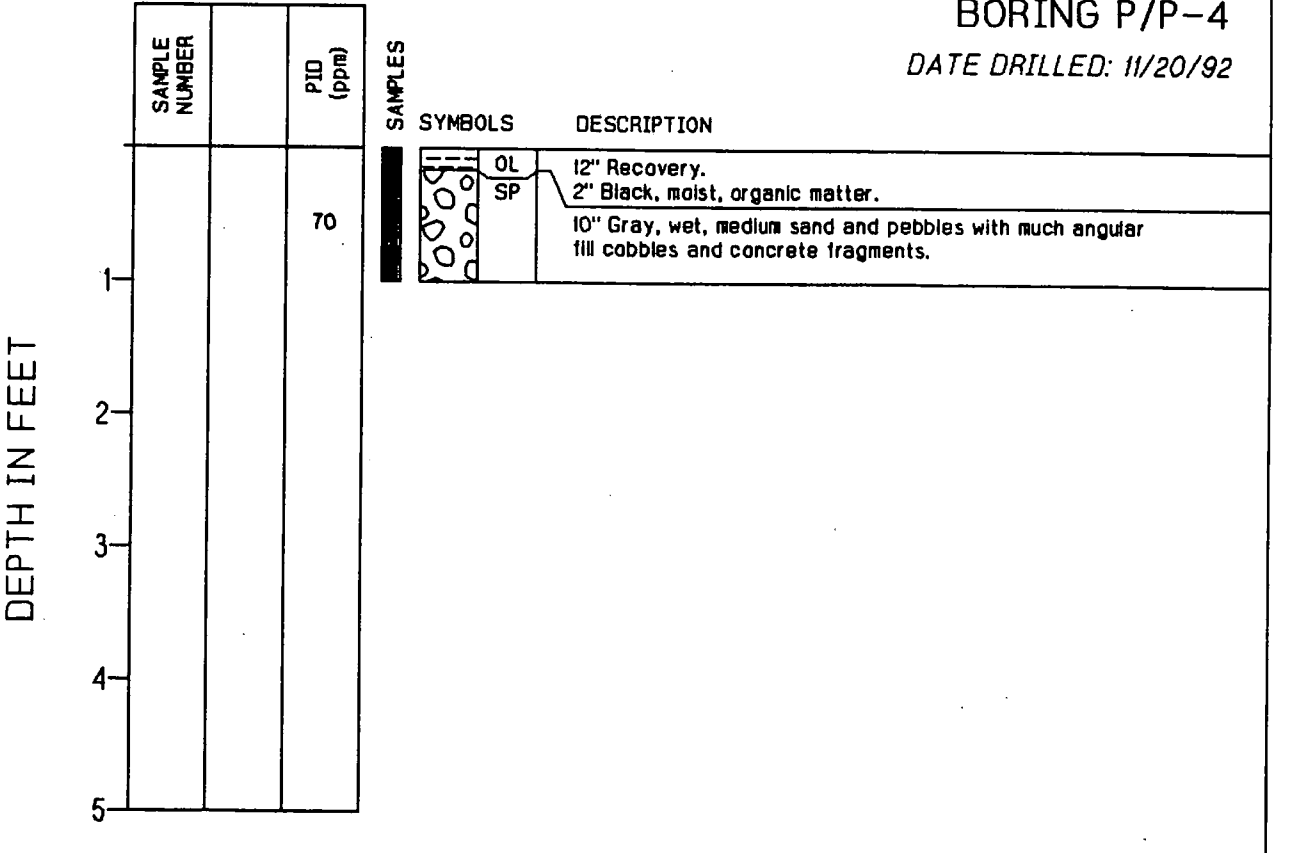
BORING P/P-3

DATE DRILLED: 11/20/92



BORING P/P-4

DATE DRILLED: 11/20/92



ENSR

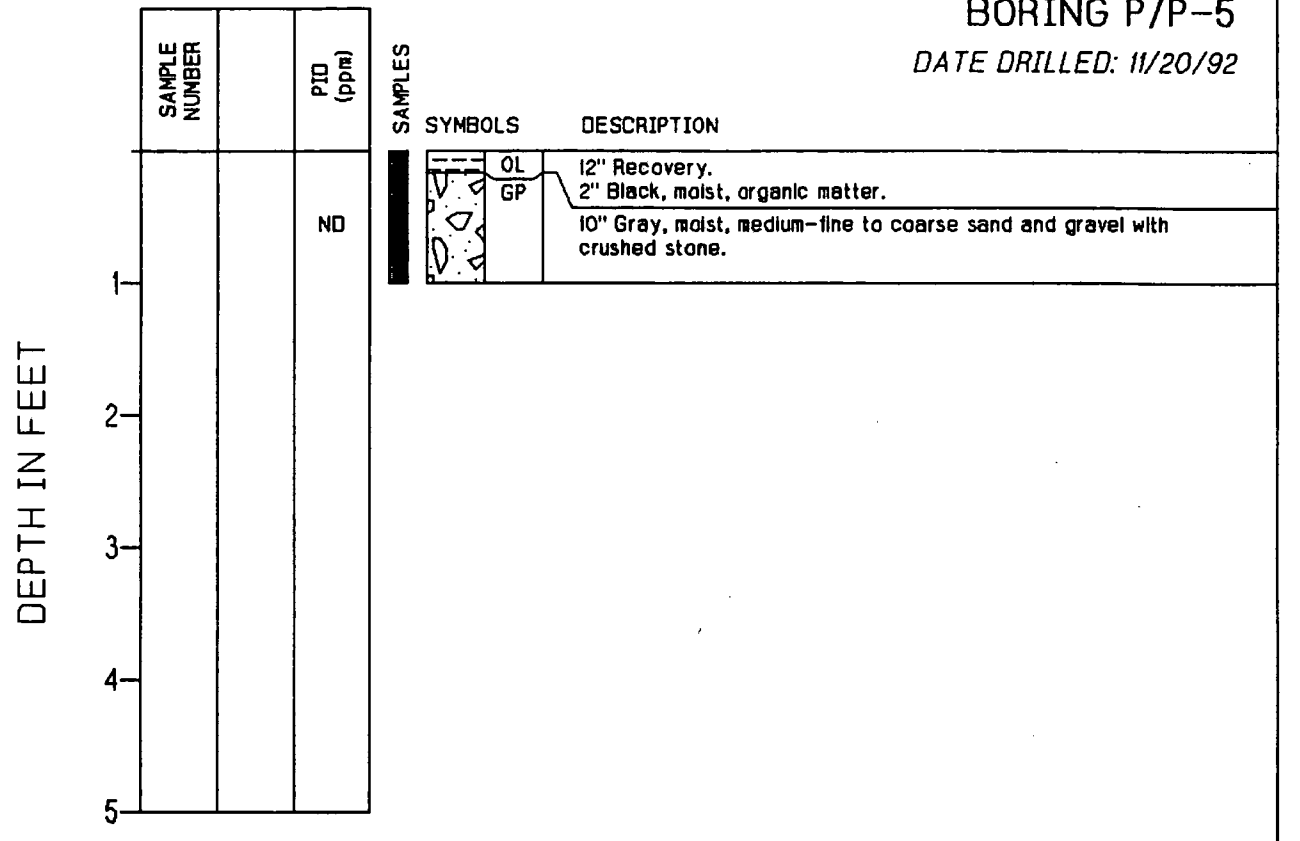
ENSR Consulting and Engineering

LOG OF HAND AUGER BORINGS
P/P-5 AND P/P-6
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

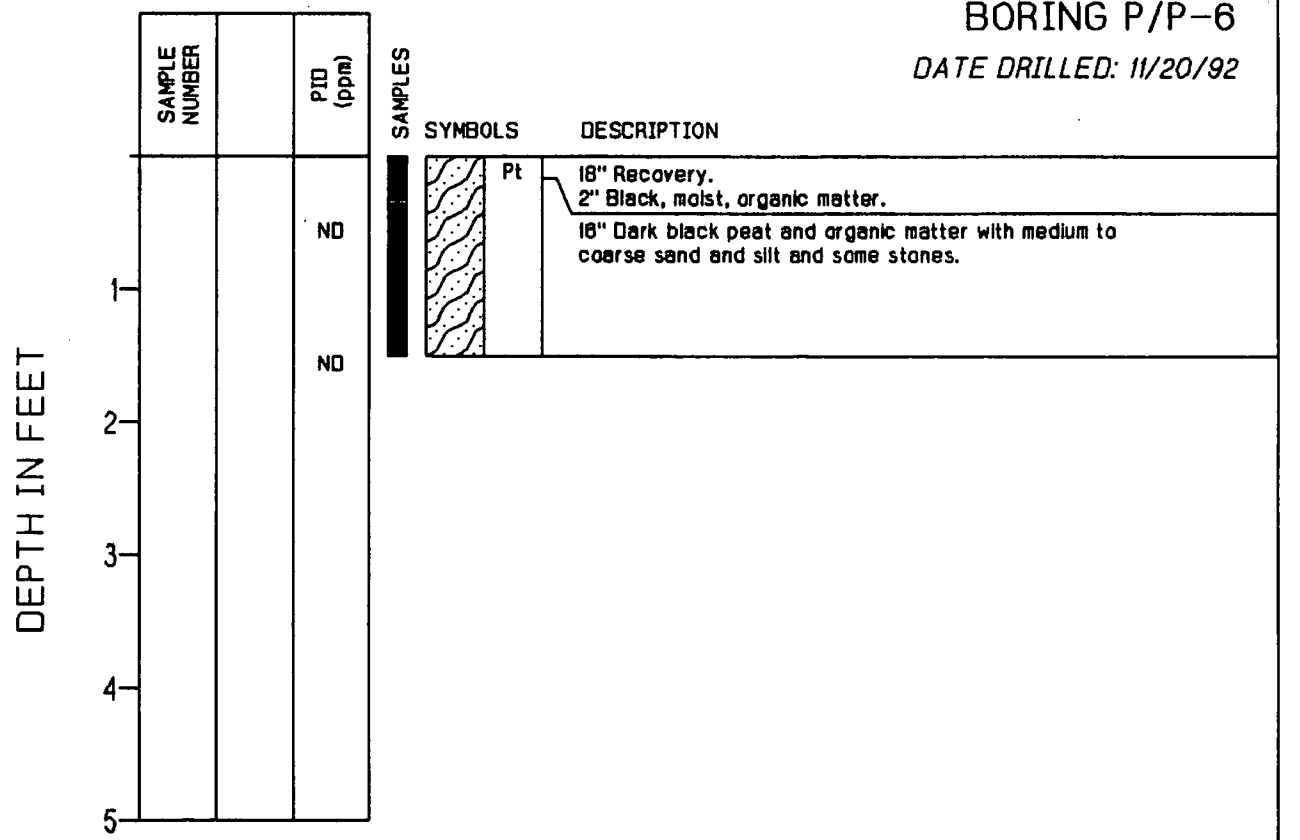
BORING P/P-5

DATE DRILLED: 11/20/92



BORING P/P-6

DATE DRILLED: 11/20/92



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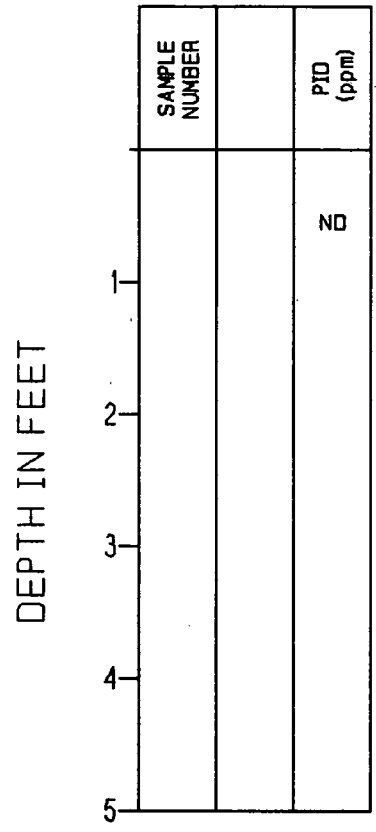
LOG OF HAND AUGER BORINGS
P/P-7 AND P/P-8
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-7

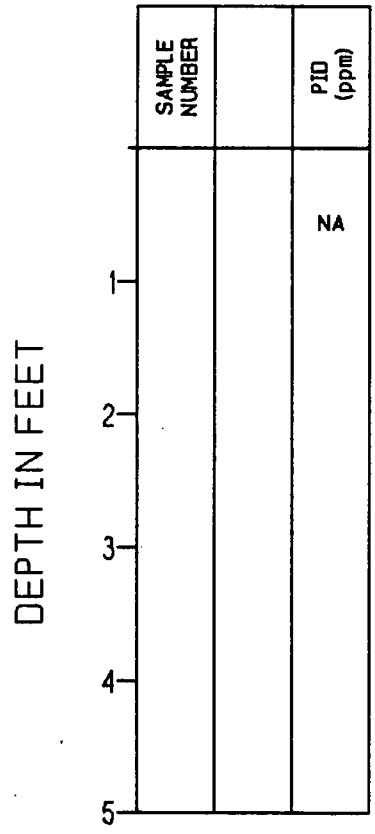
DATE DRILLED: 11/20/92



SYMBOLS	DESCRIPTION
OL	12" Recovery.
SP	2" Black, moist, organic matter.
	10" Gray, wet, coarse sands with much medium to coarse cobbles with much silt and trace clay with some fill.

BORING P/P-8

DATE DRILLED: 11/23/92



SYMBOLS	DESCRIPTION
SC	18" Recovery.
	18" Brown, wet, organic, silty clay with cobbles, gravel, and brick fragments.

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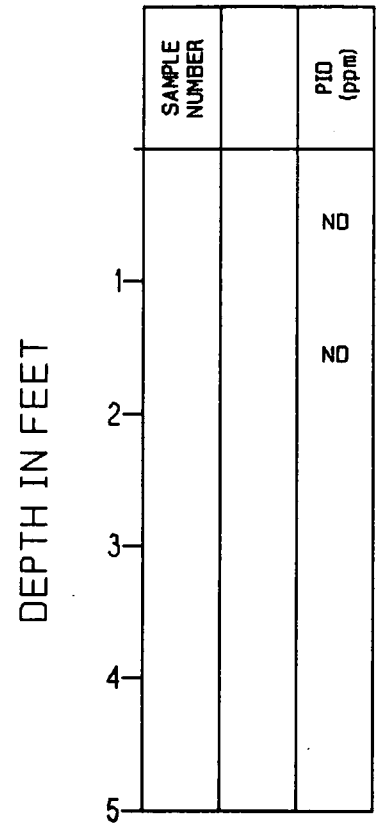
LOG OF HAND AUGER BORINGS
P/P-9 AND P/P-10
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-9

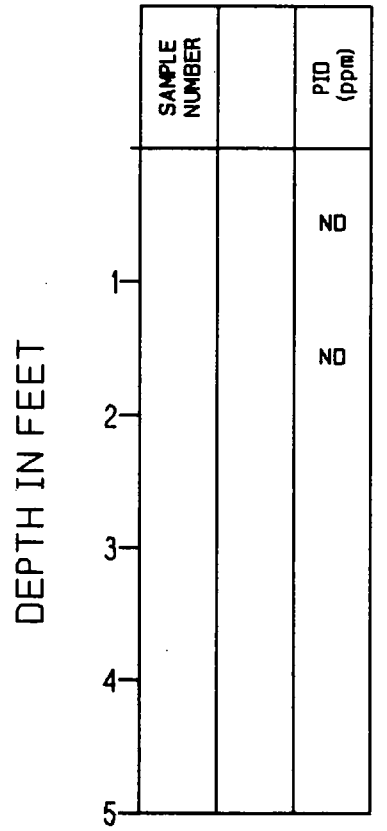
DATE DRILLED: 11/23/92



SYMBOLS	DESCRIPTION
OL	24" Recovery. 2" Black, moist, organic matter.
SP	18" Brown to reddish-brown, wet, medium to coarse sand with much poorly graded angular cobbles.

BORING P/P-10

DATE DRILLED: 11/23/92



SYMBOLS	DESCRIPTION
OL	24" Recovery. 6" Black, moist, organic silty clay.
SC	6" Dark brown, organic, silty clay with pebbles, cobbles and brick fragments.
SM	12" Brown, medium to coarse, silty sand with some clay, pebbles, and cobbles.

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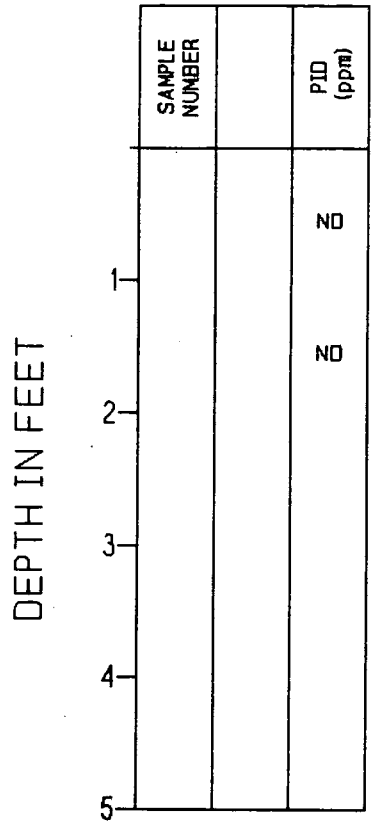
LOG OF HAND AUGER BORINGS
P/P-11 AND P/P-12
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-11

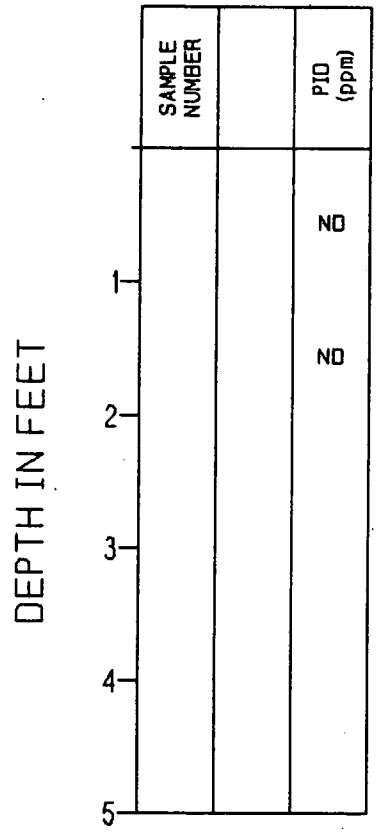
DATE DRILLED: 11/24/92



SAMPLES	SYMBOLS	DESCRIPTION
	OL	24" Recovery. 6" Brown, wet, clay with much fine silt and organic matter.
	SM	12" Brownish-black, wet, silt with medium to coarse sand with many large cobbles.
		6" Black, wet, fill material with asphalt cinders and brick fragments.

BORING P/P-12

DATE DRILLED: 11/24/92



SAMPLES	SYMBOLS	DESCRIPTION
	SM	24" Recovery. 12" Brown, wet, clayey sand with much large angular cobbles.
	SP	Large angular cobbles at 1.0'. 12" Brown to black, medium to coarse sand with much cobbles, poorly graded with trace clay.

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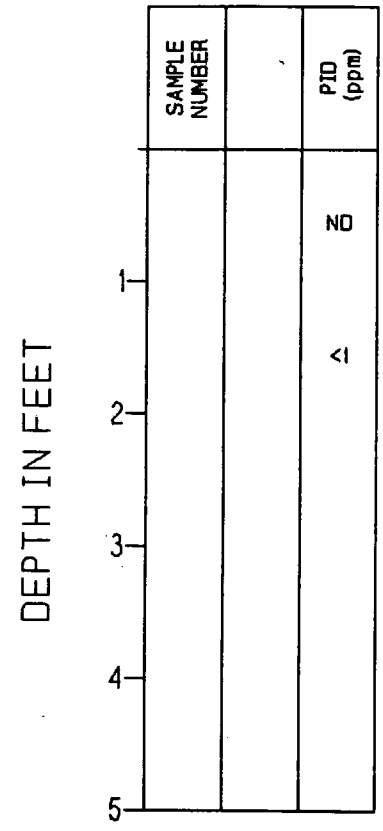
LOG OF HAND AUGER BORINGS
P/P-13 AND P/P-14
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-13

DATE DRILLED: 11/23/92

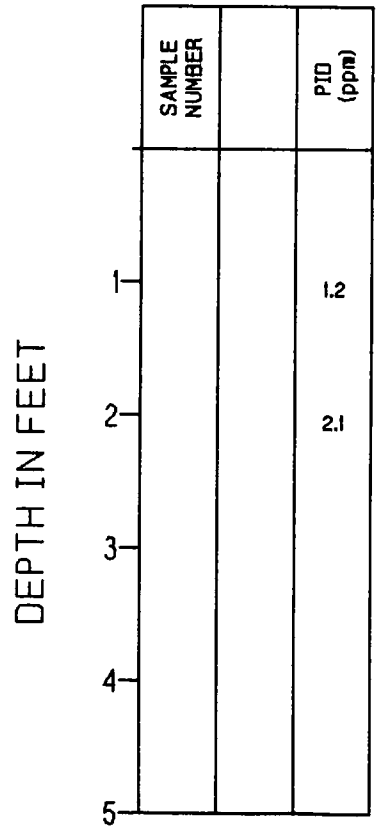


SAMPLES

SYMBOLS		DESCRIPTION
	OL	18" Recovery. 6" Black, moist, organic matter.
	SP	12" Blackish-brown, wet, clayey coarse sand with much silt and poorly graded angular cobbles.

BORING P/P-14

DATE DRILLED: 11/23/92



SAMPLES

SYMBOLS		DESCRIPTION
	SC	24" Recovery. 12" Black clay with much fine to medium sand with few medium to coarse cobbles.
	SC	12" Black clay with much fine to medium sand with few medium to coarse cobbles and fill gravel.

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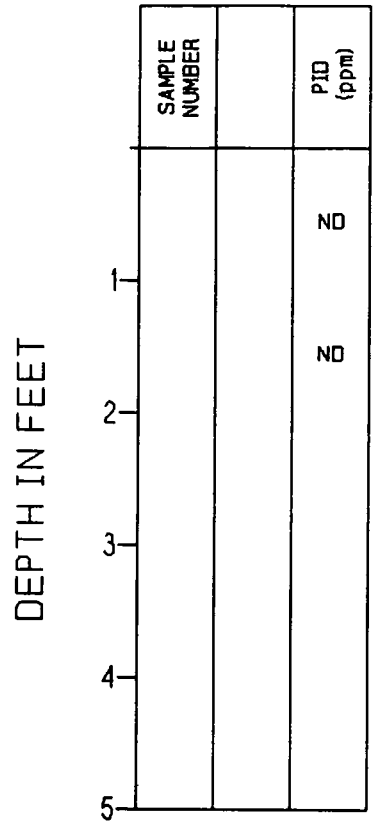
LOG OF HAND AUGER BORINGS
P/P-15 AND P/P-16
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-15

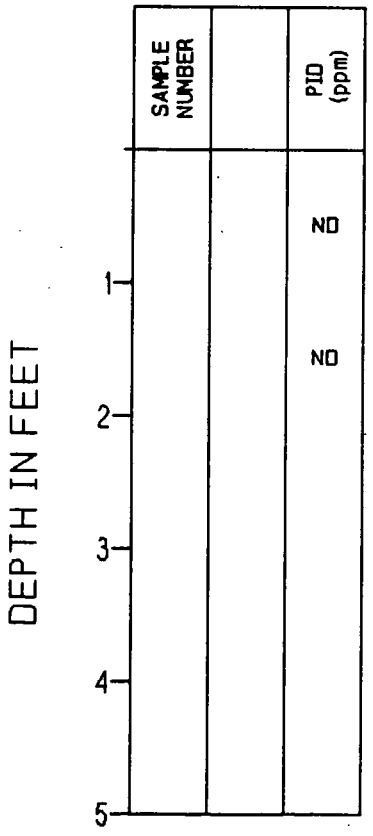
DATE DRILLED: 11/23/92



SYMBOLS		DESCRIPTION
	OL	24" Recovery. 6" Black, moist, organic matter.
	SC	18" Brown silt and fine to medium sand with some clay and much brick and wood fragments.

BORING P/P-16

DATE DRILLED: 11/20/92



SYMBOLS		DESCRIPTION
	Pt	18" Recovery. 2" Black, moist, organic matter. 16" Dark brown/black, medium to coarse sand with some crushed stone.

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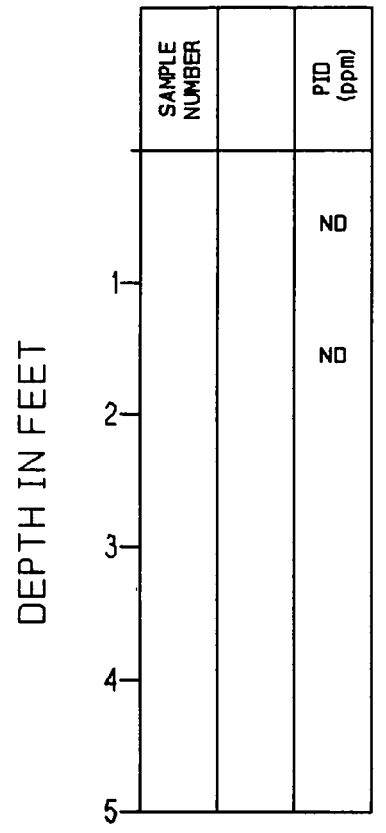
LOG OF HAND AUGER BORINGS
P/P-17 AND P/P-18
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

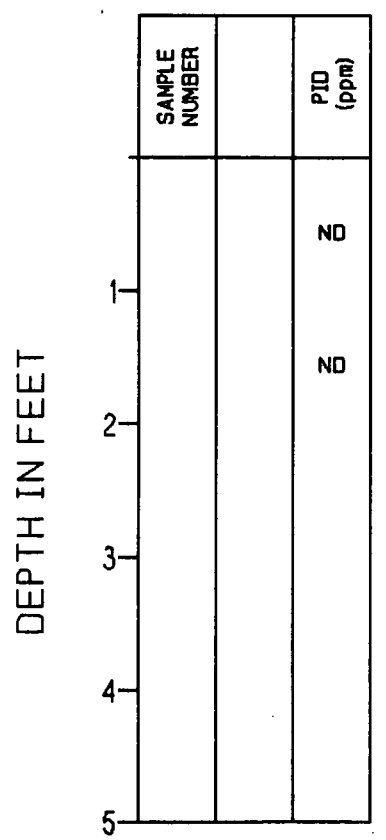
BORING P/P-17

DATE DRILLED: 11/24/92



BORING P/P-18

DATE DRILLED: 11/24/92



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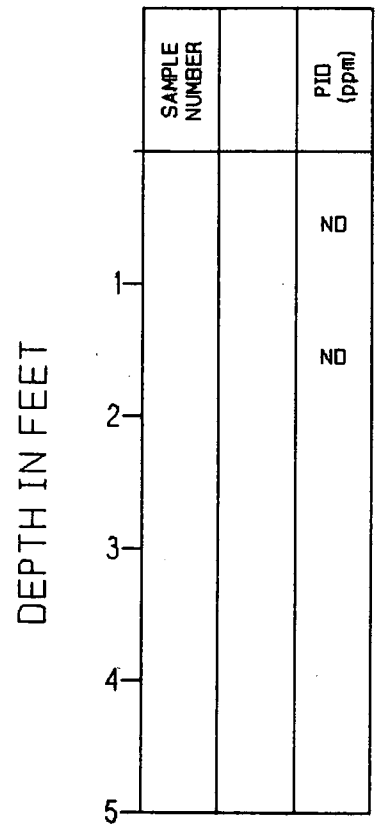
LOG OF HAND AUGER BORINGS
P/P-19 AND P/P-20
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-19

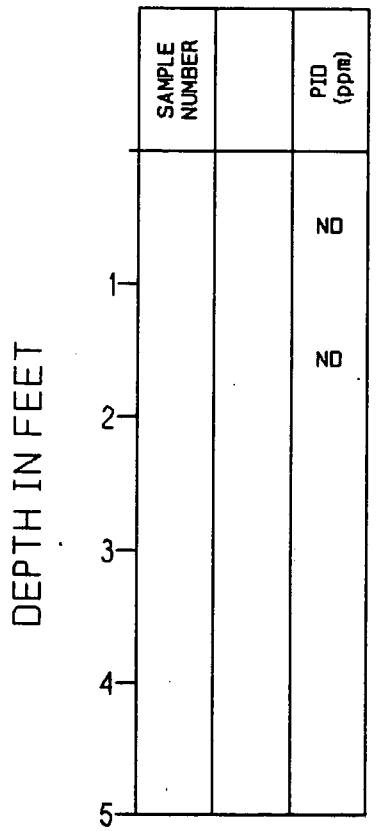
DATE DRILLED: 11/24/92



24" Recovery.
24" Brown, wet, clay with much silt and medium to coarse sand with few subrounded quartz cobbles and many angular cobbles.

BORING P/P-20

DATE DRILLED: 11/30/92



24" Recovery.
6" Buff to gray clay with much sand.
18" Brown, dry, medium to course sand with much silt, and some clay with glass shards, wire, plastic and metal.

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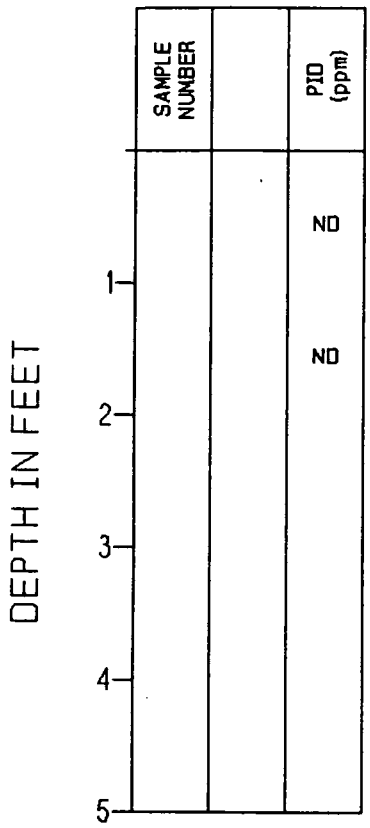
LOG OF HAND AUGER BORINGS
P/P-21 AND P/P-22
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

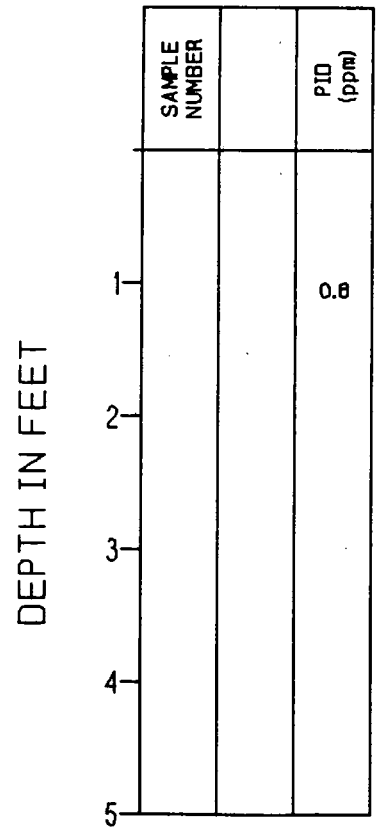
BORING P/P-21

DATE DRILLED: 11/30/92



BORING P/P-22

DATE DRILLED: 11/30/92



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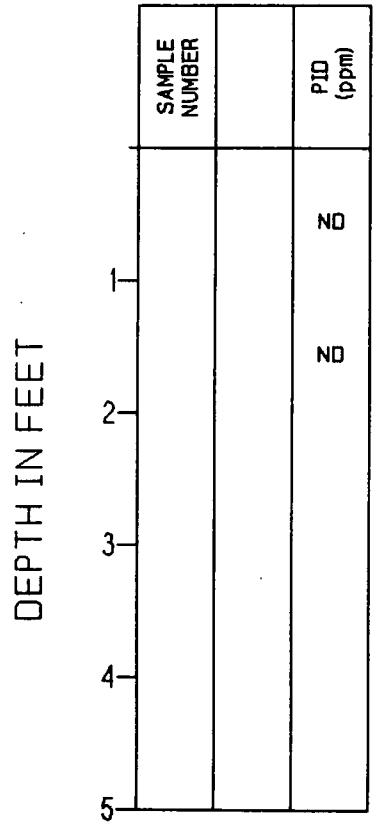
LOG OF HAND AUGER BORINGS
P/P-23 AND P/P-24
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

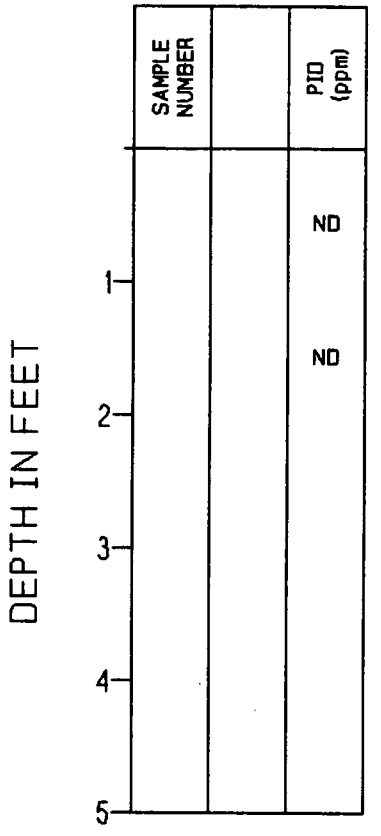
BORING P/P-23

DATE DRILLED: 11/20/92



BORING P/P-24

DATE DRILLED: 11/24/92



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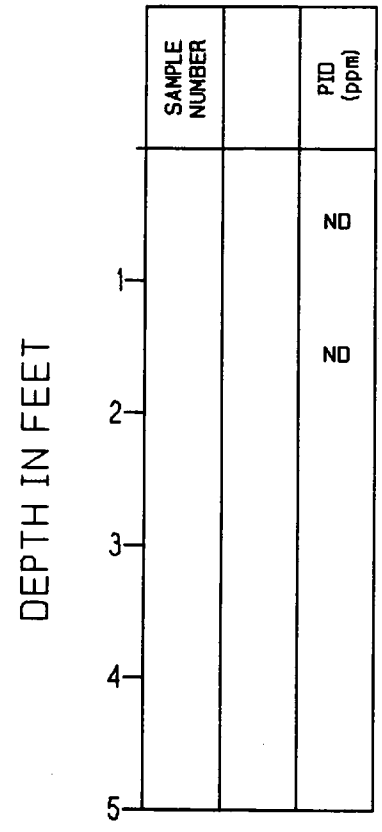
LOG OF HAND AUGER BORINGS
P/P-25 AND P/P-26
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-25

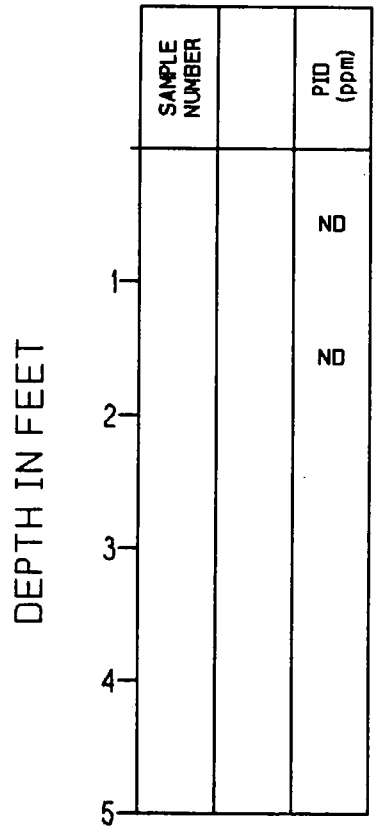
DATE DRILLED: 11/24/92



SYMBOLS		DESCRIPTION
	Pt	24" Recovery. 6" Organic black meadow matt.
	SP	18" Brownish, wet, clay, with much coarse cobbles and some small subrounded quartz pebbles.

BORING P/P-26

DATE DRILLED: 11/30/92



SYMBOLS		DESCRIPTION
	Pt	24" Recovery. 24" Black, wet, organic matter with much fines, silt, and some clay.

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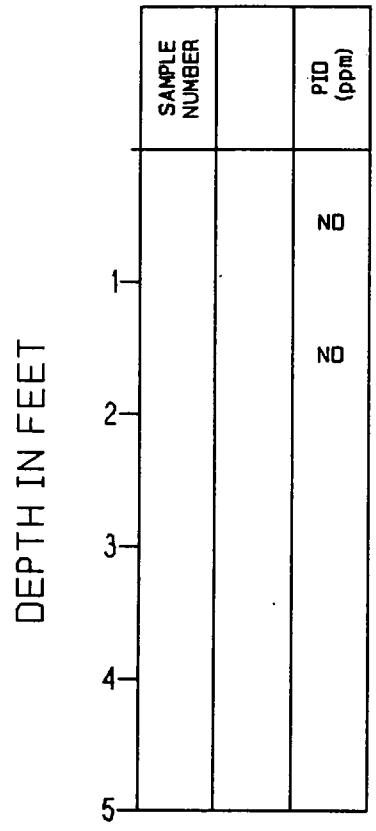
LOG OF HAND AUGER BORINGS
P/P-27 AND P/P-28
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-27

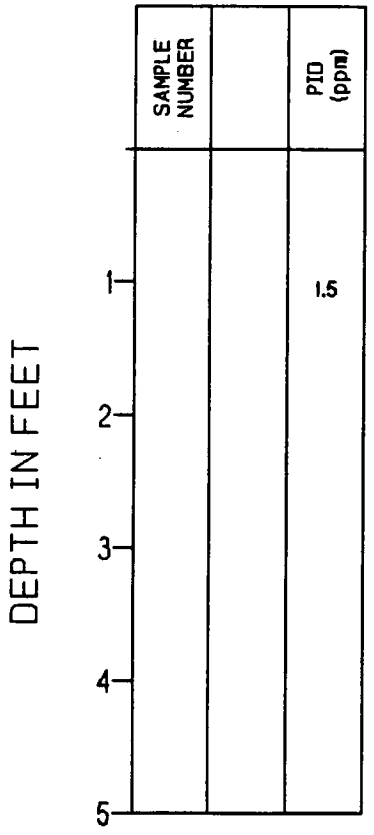
DATE DRILLED: 11/24/92



SYMBOLS	DESCRIPTION
Pt	24" Recovery. 24" Black, wet, rich, organic clay with some silt and very fine sand.

BORING P/P-28

DATE DRILLED: 11/24/92



SYMBOLS	DESCRIPTION
OL	24" Recovery. 24" Black, brown, wet, organic silt with some clay.

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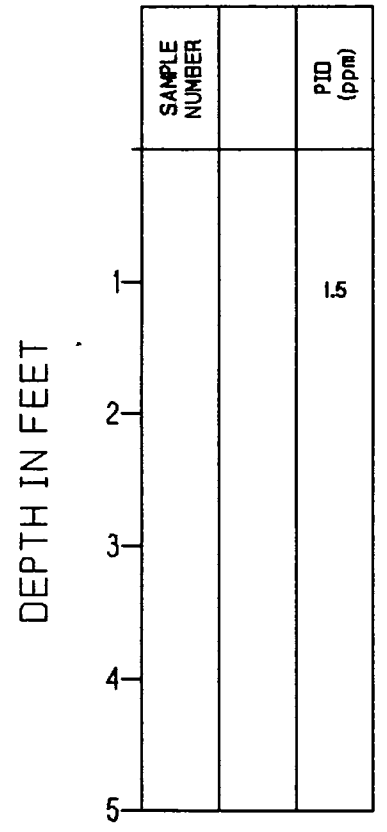
LOG OF HAND AUGER BORINGS
P/P-29 AND P/P-30
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-29

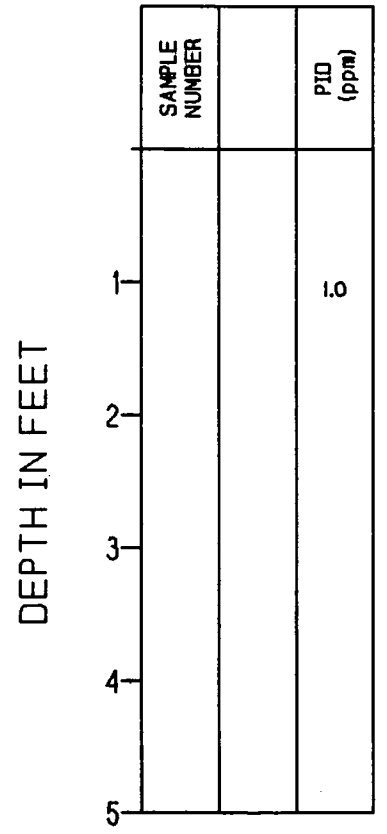
DATE DRILLED: 11/24/92



SYMBOLS	DESCRIPTION
OL	24" Recovery. 24" Black, wet, organic silt with some clay and roots.

BORING P/P-30

DATE DRILLED: 11/24/92



SYMBOLS	DESCRIPTION
OL	24" Recovery. 24" Black, wet, organic silt with some clay and roots.

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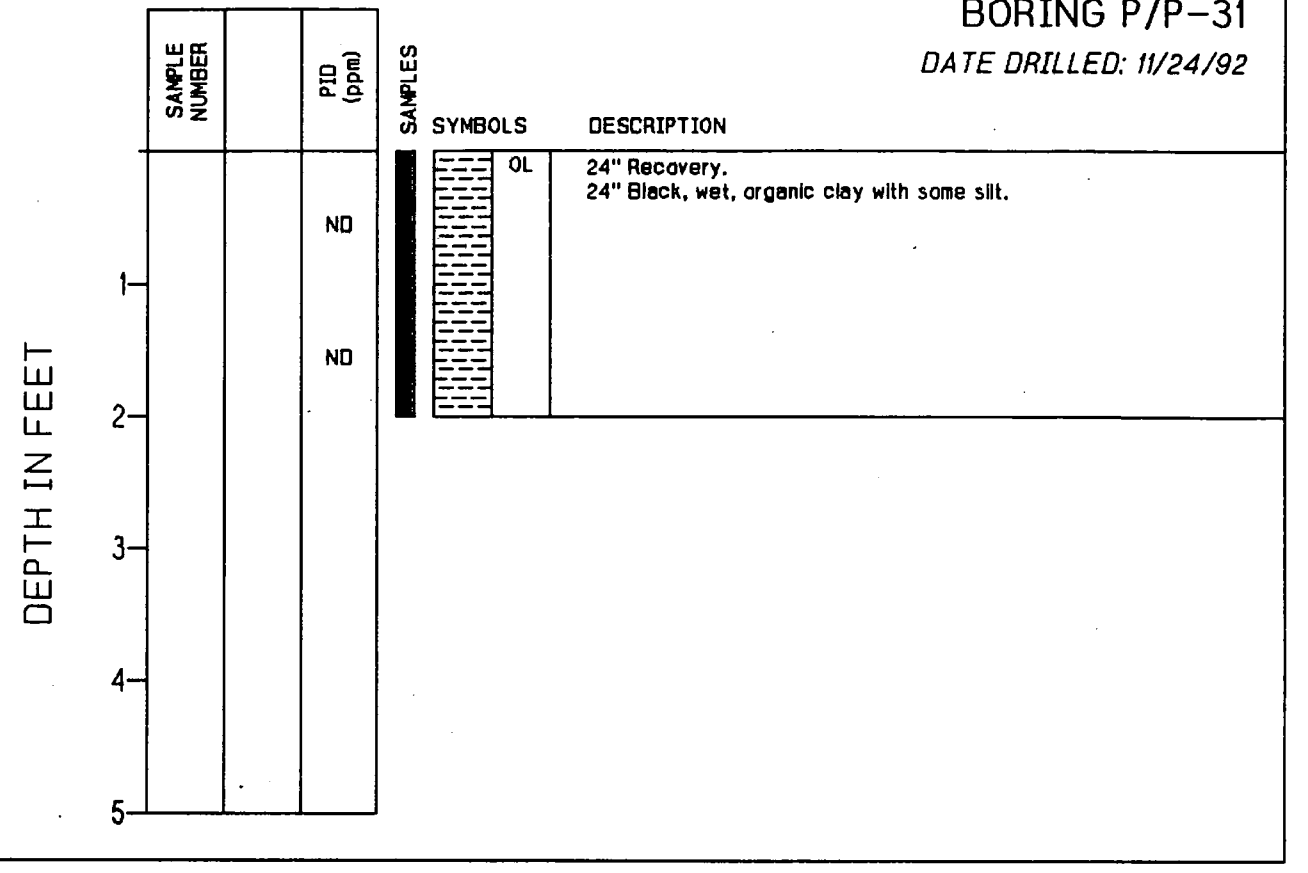
LOG OF HAND AUGER BORING P/P-31
UOP / Allied Signal
E. Rutherford, N.J.

HAND AUGER BORINGS

BORING P/P-31

DATE DRILLED: 11/24/92



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LOG OF BORING V-1

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0186-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/92
SURFACE ELEVATION Not Recovered Feet MSLD
TOTAL DEPTH OF HOLE 8 Feet
INITIAL WATER LEVEL .10 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
22						18" Recovery.
24	ND		1			18" Brown, black, wet, organic material with fine to medium sand with angular cobbles.
16						
18	ND		2			14" Recovery.
8						6" Organic material.
4	ND		3			2" Reddish-brown, fine to medium sand with much clay.
6						6" Meadow matt.
		V-1				
3	ND		4			24" Recovery.
2						14" Meadow matt.
4	ND		5			10" Gray, wet clay.
6						
7	ND		6			
			7			
			8			

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ENSR Consulting and Engineering

LOG OF BORING V-2

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0188-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/92
SURFACE ELEVATION 4.82 Feet MSLD
TOTAL DEPTH OF HOLE 8 Feet
INITIAL WATER LEVEL 4 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
1						20" Recovery.
1	ND		1			20" Brown, black, wet, organic material with fine to medium sand with angular cobbles.
18						
21	ND		2			24" Recovery.
14						7" Reddish brown, well packed silt.
14	ND		3			
8						
		V-2				
9	ND		4			24" Recovery.
7						7" Reddish brown, well packed silt with much clay.
4	ND		5			15" Meadow matt.
2						<2" Gray wet clay at very tip of spoon.
1	ND		6			
			7			
			8			

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LOG OF BORING V-3

PROJECT UOP / Allied Signal	DRILLING COMPANY Environmental Drilling, Inc.
LOCATION E. Rutherford, N.J.	DATE DRILLED 11/17/92
JOB NUMBER 0186-002-520	SURFACE ELEVATION 4.52 Feet MSLD
GEOLOGIST Andrew J. Coleman	TOTAL DEPTH OF HOLE 10 Feet
DRILL RIG H.S.A. CME-75 ATV	INITIAL WATER LEVEL .25 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
30						18" Recovery.
30	ND		1			18" Gray, wet, poorly graded gravel with much sand, silt, and clay.
28						4" Gray clay with much rounded cobbles.
12	ND		2			Groundwater encountered at 4".
5						6" Recovery.
2	ND		3			6" Reddish-brown, silty clay with much fine sand.
5		V-3				
5	ND		4			6" Recovery.
2						6" Gray, moist clay with much large angular cobbles.
1	ND		5			
1						
12	ND		6			12" Recovery.
5						6" Gray, wet gravels.
7	ND		7			6" Meadow matt.
8						
9	ND		8			23" Recovery.
5						1" Meadow matt.
7	ND		9			22" Gray, wet clay and silty sand with much clay.
8						
8	ND		10			
			11			
			12			

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LOG OF BORING V-4

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0186-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/92
SURFACE ELEVATION 5.27 Feet MSLD
TOTAL DEPTH OF HOLE 8 Feet
INITIAL WATER LEVEL 3.92 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
8	1					24" Recovery.
18	2		1			12" Dark brown, moist, clay with much angular fill cobbles.
42	5					6" Fill with some asphalt cobbles.
10	2		2			6" Reddish-brown clay with much fine sand.
8	ND					12" Recovery.
3	ND		3			6" Reddish-brown clay with much fine sand and silt.
3	4					6" Black clay with much fine sand and silt, with paper products; wet at tip.
2	10		4			24" Recovery.
WH	12					18" Black clay with some organics; meadow matt.
		V-4				5" Brown, dry meadow matt.
WH	13		5			3" Gray, wet, clay, with little silt.
WH	7					
WH	7		6			Encountered gray, wet clay at 6'.
			7			
			8			

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LOG OF BORING V-5

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0186-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/82
SURFACE ELEVATION 4.84 Feet MSLD
TOTAL DEPTH OF HOLE 8 Feet
INITIAL WATER LEVEL .25 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
9	ND					18" Recovery. 10" Brown, wet clay with much angular cobbles. 8" Reddish clay with much silt; no cobbles.
9	1		1			
22	1					
8	1		2			12" Recovery. 6" Black, poorly sorted angular pebbles (fill). 6" Brownish-black, well sorted, wet, fine to medium sand with much clay.
3	ND					
3	ND		3			
8	1					
4	30	V-5	4			6" Recovery. 6" Dark brown clay with some peat, more clay than organics; encountering meadow matt.
2	ND					
1	ND		5			
2	ND					
2	100		6			6" Recovery. 3" Gray, dry meadow matt. 3" Gray, wet clay.
2	ND					
2	ND		7			
2	ND					
2	70		8			Boring terminated at 8' due to encountering bottom of meadow matt. Encountered 3" gray, wet clay with little to no silt.
			9			
			10			

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LOG OF BORING V-6

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0186-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/92
SURFACE ELEVATION Not Recovered Feet MSLD
TOTAL DEPTH OF HOLE 8 Feet
INITIAL WATER LEVEL 2 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
9	4					24" Recovery.
10	2		1			12" Brown clay with much angular cobbles.
12	5					6" Reddish-brown, dense silt with clay.
7	2		2			6" Brown, fine sand with much clay.
2	ND					6" Recovery.
1	ND		3			6" Grayish-green clay with much sand and silt with glass shards.
1	ND					
1	4		4			6" Recovery.
1	ND					6" Black clay with some organics with much small rounded cobbles.
1	ND		5			Top of meadow matt.
1	ND					
		V-6				
2	2		6			24" Recovery.
2	3					6" Meadow matt with much clay.
4	2		7			6" Gray, wet clay.
4	2					12" Gray, wet silty sand with clay.
5	1		8			Punctured through meadow matt at 6'6" to gray, wet clay.
			9			
			10			

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LOG OF BORING V-7

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0188-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/92
SURFACE ELEVATION 5.08 Feet MSLD
TOTAL DEPTH OF HOLE 8 Feet
INITIAL WATER LEVEL 2 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
4	ND					12" Recovery. 6" Reddish-brown, dry clay with much silt. 6" Black clay with much coarse cobbles.
3	ND		1			
2	0.6					
2	0.8		2			5" Recovery. 5" Brown, black fill glass, brown glass, and newspaper fragments.
3	ND					
2	ND		3			
1	ND					
1	<1		4			6" Recovery. 1" Brown, black wet glass and fill. 5" Peat with much clay with meadow matt.
1	ND					
1	ND		5			
2	ND					
4	1	V-7	6			
			7			
			8			

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ENSR Consulting and Engineering

LOG OF BORING V-8

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0188-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/92
SURFACE ELEVATION 5.23 Feet MSLD
TOTAL DEPTH OF HOLE 10 Feet
INITIAL WATER LEVEL 4.8 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
14	1					2" Recovery. 2" Reddish-brown, dry, clayey sand with much silt. Hit rock; stopped recovery in spoon.
23	ND		1			
33	ND					
34	ND		2			24" Recovery. 24" Reddish-brown, dry, compact, clayey silt with much fine sand.
18	1					
20	0.8		3			
23	0.8					
21	0.8		4			24" Recovery. 24" Reddish-brown, wet, clayey, fine sand.
4	ND					
2	ND		5			
2	ND					
3	ND		6			24" Recovery. 6" Tan to buff to gray, wet fine sands with clay. 6" Tan to buff to gray, wet fine sands with much clay. 12" Tan to buff to gray, wet, dense clay with some fine sand.
3	2 (FID)	V-8				
4	8 (FID)		7			
2	3 (FID)					
2	2 (FID)		8			24" Recovery. 24" Brown, wet, well sorted fine to medium sand with much silt and clay.
4	ND (FID)					
4	ND (FID)		9			
7	ND (FID)					
7	ND (FID)		10			
			11			
			12			

ENSR

ENSR Consulting and Engineering

LOG OF BORING V-9

PROJECT UOP / Allied Signal
LOCATION E. Rutherford, N.J.
JOB NUMBER 0188-002-520
GEOLOGIST Andrew J. Coleman
DRILL RIG H.S.A. CME-75 ATV

DRILLING COMPANY Environmental Drilling, Inc.
DATE DRILLED 11/17/92
SURFACE ELEVATION Not Recovered Feet MSLD
TOTAL DEPTH OF HOLE 8 Feet
INITIAL WATER LEVEL 3.5 Feet

BLOWS/6 in.	PID (ppm)	SAMPLE NUMBER	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
3	ND					24" Recovery. 12" Brown with redish hues, dry, densely packed silt and fine sand with some clay. 12" Black with redish hues, dry, densely packed silt and fine sand with some clay.
4	ND		1			
2	ND					
6	ND		2			12" Recovery. 6" Brown, fine to medium sand with some black staining; little organics; moist. 6" Peat meadow matt.
6	ND					
2	ND		3			
		V-9				
1	1.0					
1	ND		4			24" Recovery. 23" Meadow matt. 1" Gray, wet clay; end of meadow matt.
1	Not Taken					
1	Not Taken		5			
2	Not Taken					
2	Not Taken		6			
			7			
			8			

APPENDIX B

MONITORING WELL LOGS
AND
FORM A: AS-BUILT CERTIFICATIONS
FOR
WELLS MW-35 THROUGH MW-41

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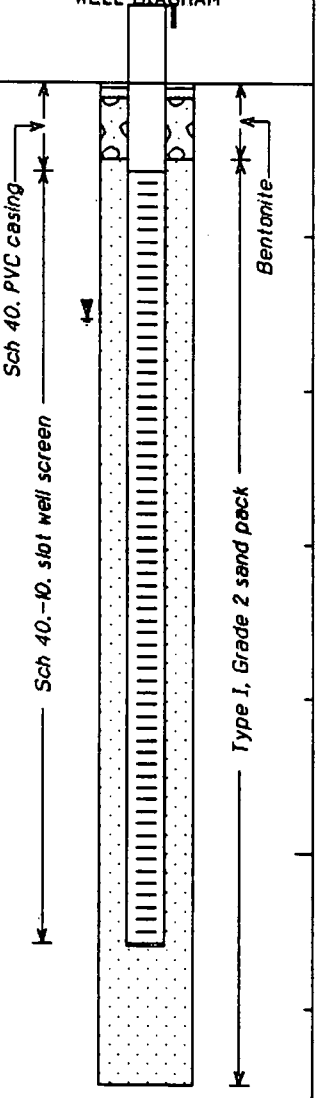
MONITORING WELL MW-35

PROJECT: *Allied Signal*	LOCATION: *UOP / E. Rutherford, N.J.*
DATE DRILLED/COMPLETED: *11/18/92 11/19/92*	SURFACE ELEVATION: *Feet MSLD*
DEPTH TO GROUNDWATER: *1.54 feet*	TOP OF CASING ELEVATION: *2.71 feet MSLD*
DRILLING METHOD: *Hollow Stem Auger*	TOTAL DEPTH: *5.58 Feet*
DRILLING COMPANY: *Environmental Drilling, Inc.*	GEOLOGIST: *ANDREW COLEMAN*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	FID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
1–5					SP	Reddish-brown, dry fine to medium, well compacted sand with much rounded and subrounded cobbles with much silt.
5–7		2 1 1 7	ND ND		SP+Pt	24" Recovery 2" Dark reddish-brown, moist clay with much angular cobbles and much silt. 18" Peat, meadow matt. 4" Gray, moist clay.

WELL DIAGRAM



JOB NUMBER: 0186-002-520

ENSR

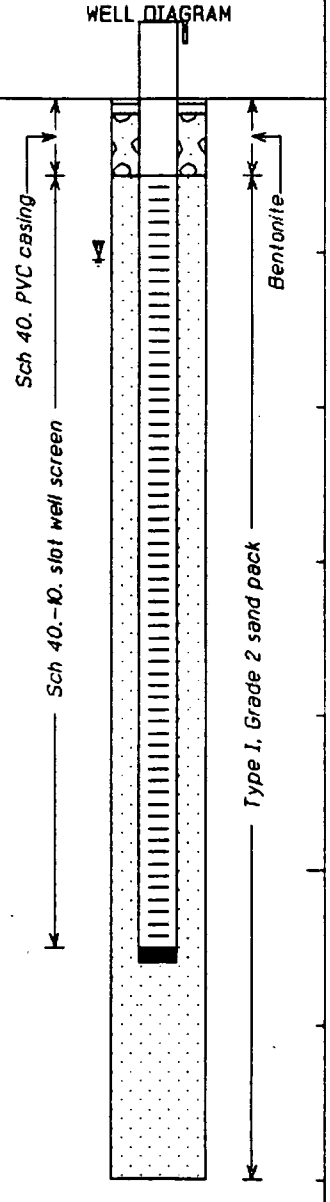
ENSR Consulting and Engineering

MONITORING WELL MW-36

PROJECT: *Allied Signal*	LOCATION: *UOP / E. Rutherford, N.J.*
DATE DRILLED/COMPLETED: *11/18/92 11/20/92*	SURFACE ELEVATION: *Feet MSLD*
DEPTH TO GROUNDWATER: *1.05 feet*	TOP OF CASING ELEVATION: *2.25 feet MSLD*
DRILLING METHOD: *Hollow Stem Auger*	TOTAL DEPTH: *5.5 Feet*
DRILLING COMPANY: *Environmental Drilling, Inc.*	GEOLOGIST: *ANDREW COLEMAN*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	FID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
1–5					SP	Reddish-brown, dry fine to medium, clay with much hard well packed silt and fine sand.
5					SP+Pt	24" Recovery 23" Peat, meadow matt. 1" Gray, moist clay.
6		1	25			
		1				
7		1	25			
		2.5				
8						

WELL DIAGRAM



JOB NUMBER: 0188-002-520

ENSR

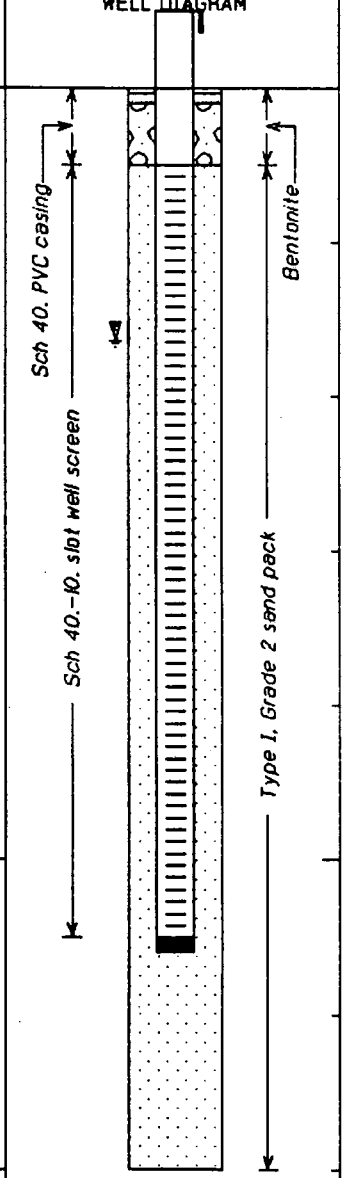
ENSR Consulting and Engineering

MONITORING WELL MW-37

PROJECT: *Allied Signal*	LOCATION: *UOP / E. Rutherford, N.J.*
DATE DRILLED/COMPLETED: *11/18/92 11/20/92*	SURFACE ELEVATION: *Feet MSLD*
DEPTH TO GROUNDWATER: *1.64 feet*	TOP OF CASING ELEVATION: *2.77 feet MSLD*
DRILLING METHOD: *Hollow Stem Auger*	TOTAL DEPTH: *5.5 Feet*
DRILLING COMPANY: *Environmental Drilling, Inc.*	GEOLOGIST: *ANDREW COLEMAN*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	FID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
1–5					SP	Reddish-brown, dry fine silty sands with much clay.
5–7		1 1 2 2	35 50		SP+Pt	24" Recovery 23" Peat, meadow matt. 1" Gray, moist clay.

WELL DIAGRAM



JOB NUMBER: 0186-002-520

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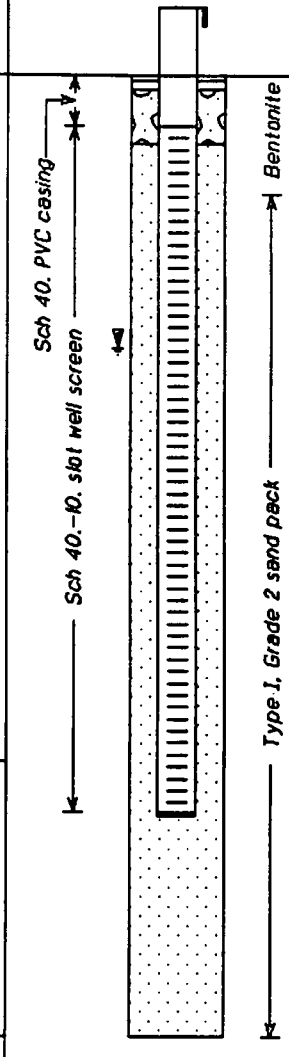
MONITORING WELL MW-38

PROJECT: *Allied Signal*	LOCATION: *UOP / E. Rutherford, N.J.*
DATE DRILLED/COMPLETED: *11/19/92 11/20/92*	SURFACE ELEVATION: *Feet MSLD*
DEPTH TO GROUNDWATER: *1.99 feet*	TOP OF CASING ELEVATION: *2.75 feet MSLD*
DRILLING METHOD: *Hollow Stem Auger*	TOTAL DEPTH: *5.37 Feet*
DRILLING COMPANY: *Environmental Drilling, Inc.*	GEOLOGIST: *ANDREW COLEMAN*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	FID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
1–5					SP	Reddish-brown, dry fine silty clay with much fine sand and silt with much poorly sorted angular cobbles and fill gravels.
5–7		1 1 4 wh	ND ND		SP+Pt	24" Recovery 23" Peat, meadow matt. <" Gray, moist clay.

WELL DIAGRAM



JOB NUMBER: 0186-002-520

ENSR

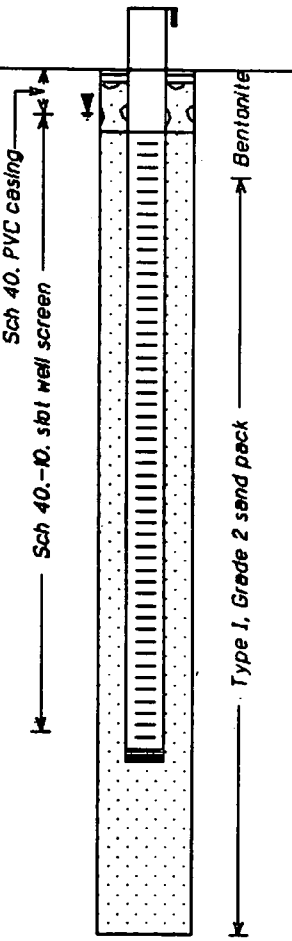
ENSR Consulting and Engineering

MONITORING WELL MW-39

PROJECT: *Allied Signal*	LOCATION: *UOP / E. Rutherford, N.J.*
DATE DRILLED/COMPLETED: *11/18/92 11/20/92*	SURFACE ELEVATION: *Feet MSLD*
DEPTH TO GROUNDWATER: *.36 feet*	TOP OF CASING ELEVATION: *3.25 feet MSLD*
DRILLING METHOD: *Hollow Stem Auger*	TOTAL DEPTH: *5.5 Feet*
DRILLING COMPANY: *Environmental Drilling, Inc.*	GEOLOGIST: *ANDREW COLEMAN*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	FID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
1		22	ND		SP	19" Recovery 8" Brown, black, wet, organic material. 11" Fine to medium sand and angular cobbles.
		24				
2		16	ND			
		18				8" Recovery 2" Reddish-brown fine to medium sand with much clay. 6" Meadow matt.
3		8	ND			
		4				
4		6	ND			
		3				24" Recovery 14" Peat, meadow matt. 10" Gray, moist clay.
5		2	ND			
		4			SP+Pt	
6		6	ND			
		7				
7						
8						
9						
10						

WELL DIAGRAM



JOB NUMBER: 0188-002-520

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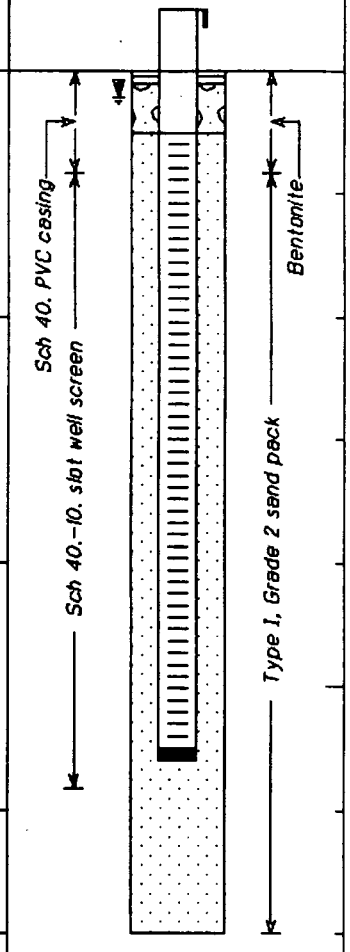
MONITORING WELL MW-40

PROJECT: *Allied Signal*	LOCATION: *UOP / E. Rutherford, N.J.*
DATE DRILLED/COMPLETED: *11/18/92 11/20/92*	SURFACE ELEVATION: *4.7 Feet MSLD*
DEPTH TO GROUNDWATER: *.22 feet*	TOP OF CASING ELEVATION: *3.12 feet MSLD*
DRILLING METHOD: *Hollow Stem Auger*	TOTAL DEPTH: *5.83 Feet*
DRILLING COMPANY: *Environmental Drilling, Inc.*	GEOLOGIST: *ANDREW COLEMAN*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	FID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
1		1	ND		SP	20" Recovery 8" Brown, black, wet, organic material. 12" Fine to medium sand and angular cobbles.
		1				
		18	ND			
2		21				24" Recovery 24" Reddish brown well packed silt and fine sand.
		14	ND			
3		14				
		8	ND			
4		8				24" Recovery 7" Reddish brown well packed silt with much clay. 15 meadow matt. 2" Gray, moist clay.
		7	ND			
5		4			SP+Pt	
		2	ND			
6		1				
7						boring terminated at 7.0'.
8						
9						
10						

WELL DIAGRAM



JOB NUMBER: 0186-002-520

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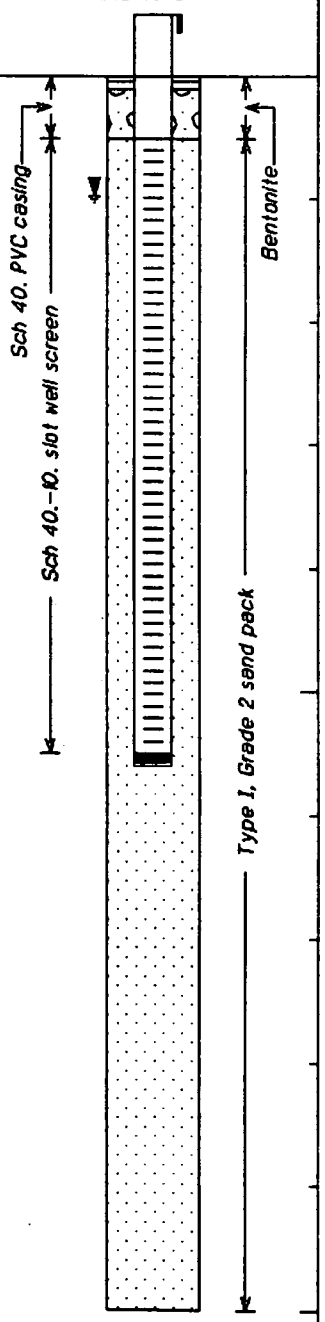
ENSR Consulting and Engineering

MONITORING WELL MW-41

PROJECT: *Allied Signal*	LOCATION: *UOP / E. Rutherford, N.J.*
DATE DRILLED/COMPLETED: *11/18/92 11/20/92*	SURFACE ELEVATION: *4.6 Feet MSLD*
DEPTH TO GROUNDWATER: *.97 feet*	TOP OF CASING ELEVATION: *2.75 feet MSLD*
DRILLING METHOD: *Hollow Stem Auger*	TOTAL DEPTH: *5.5 Feet*
DRILLING COMPANY: *Environmental Drilling, Inc.*	GEOLOGIST: *ANDREW COLEMAN*

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	FID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
1		30	ND		SP	18" Recovery 14" Gray, wet, poorly graded gravel with much sand, silt and clay. 4" Gray clay with much rounded cobbles.
		30				
2		26	ND			
		12				8" Recovery 8" Reddish brown well packed silty clay with large angular cobbles.
3		5	ND			
		2				
4		5				8" Recovery 6" Gray, moist clay with much large angular cobbles.
		2	ND			
5		1				
		1	ND			
6		12				18" Recovery 12" Gravels. 6" Meadow matt.
		5	ND			
7		7			SP+Pt	
		9	ND			
8		9				23" Recovery 1" Meadow matt 22" Gray clay and silty sand with much clay.
		5	ND			
9		7				
		7	ND			
10		8				

WELL DIAGRAM



JOB NUMBER: 0188-002-520

GROUND WATER

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Permittee: Allied Signal Corporation
Name of Facility: Universal Oil Products
Location: Route 17
East Rutherford, New Jersey
NJPDES Permit No.: NJ Not applicable

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEPE's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-31639
Owner's Well Number (As shown on the application or plans):	MW-35
Well completion Date:	11/18/92
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	2.17
Total Depth of Well (one-tenth of a foot):	5.58
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	3.0
Screen Length (feet):	5.0
Screen Slot Size:	10 Slot
Screen Material:	PVC
Casing Material: (PVC, Steel or Other - Specify):	PVC
Casing Diameter (Inches):	4
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	1.54
Yield (Gallons per Minute):	0.16 g/min
Length of time well pumped or Bailed:	0 Hours 28 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

E. Hauge

Signature

Earl Hauge

(Please type or print) Name

SEAL

1130

License #

GROUND WATER

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Permittee: Allied Signal Corporation
Name of Facility: Universal Oil Products
Location: Route 17
East Rutherford, New Jersey
NJPDES Permit No.: NJ Not applicable

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEPE's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-31640
Owner's Well Number (As shown on the application or plans):	MW-36
Well completion Date:	11/20/92
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	2.25
Total Depth of Well (one-tenth of a foot):	5.50
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	2.75
Screen Length (feet):	5.0
Screen Slot Size:	10 Slot
Screen Material:	PVC
Casing Material: (PVC, Steel or Other - Specify):	PVC
Casing Diameter (Inches):	4
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	1.05
Yield (Gallons per Minute):	0.2
Length of time well pumped or Bailed:	0 Hours 45 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

E. Hauge

Signature

Earl Hauge

(Please type or print) Name

SEAL

1130

License #

GROUND WATER

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Permittee: Allied Signal Corporation
Name of Facility: Universal Oil Products
Location: Route 17
East Rutherford, New Jersey
NJPDES Permit No.: NJ Not applicable

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEPE's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-31641
Owner's Well Number (As shown on the application or plans):	MW-37
Well completion Date:	11/20/92
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	2.33
Total Depth of Well (one-tenth of a foot):	5.33
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	2.83
Screen Length (feet):	5.0
Screen Slot Size:	10 Slot
Screen Material:	PVC
Casing Material: (PVC, Steel or Other - Specify):	PVC
Casing Diameter (Inches):	4
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	1.64
Yield (Gallons per Minute):	0.44
Length of time well pumped or Bailed:	0 Hours 47 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

E. Hauge

Signature

Earl Hauge

(Please type or print) Name

SEAL

1130

License #

GROUND WATER

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Permittee: Allied Signal Corporation

Name of Facility: Universal Oil Products

Location: Route 17

East Rutherford, New Jersey

NJPDES Permit No.: NJ Not applicable

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEPE's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-31642
Owner's Well Number (As shown on the application or plans):	MW-38
Well completion Date:	11/20/92
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	2.50
Total Depth of Well (one-tenth of a foot):	5.37
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	3.37
Screen Length (feet):	5.0
Screen Slot Size:	10 Slot
Screen Material:	PVC
Casing Material: (PVC, Steel or Other - Specify):	PVC
Casing Diameter (Inches):	4
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	1.99
Yield (Gallons per Minute):	0.2
Length of time well pumped or Bailed:	0 Hours 45 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

E. Hauge

Signature

Earl Hauge

(Please type or print) Name

SEAL

1130

License #

GROUND WATER

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Permittee: Allied Signal Corporation
Name of Facility: Universal Oil Products
Location: Route 17
East Rutherford, New Jersey
NJPDES Permit No.: NJ Not applicable

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEPE's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-31636
Owner's Well Number (As shown on the application or plans):	MW-39
Well completion Date:	11/20/92
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	3.00
Total Depth of Well (one-tenth of a foot):	5.50
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	3.50
Screen Length (feet):	5.0
Screen Slot Size:	10 Slot
Screen Material:	PVC
Casing Material: (PVC, Steel or Other - Specify):	PVC
Casing Diameter (Inches):	4
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	0.36
Yield (Gallons per Minute):	0.15
Length of time well pumped or Bailed:	0 Hours 20 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

E. Hauge

Signature

Earl Hauge

(Please type or print) Name

SEAL

1130

License #

GROUND WATER

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Permittee: Allied Signal Corporation
Name of Facility: Universal Oil Products
Location: Route 17
East Rutherford, New Jersey
NJPDES Permit No.: NJ Not applicable

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEPE's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-31637
Owner's Well Number (As shown on the application or plans):	MW-40
Well completion Date:	11/20/92
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	3.00
Total Depth of Well (one-tenth of a foot):	5.83
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	3.83
Screen Length (feet):	5.0
Screen Slot Size:	10 Slot
Screen Material:	PVC
Casing Material: (PVC, Steel or Other - Specify):	PVC
Casing Diameter (Inches):	4
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	0.22
Yield (Gallons per Minute):	0.15
Length of time well pumped or Bailed:	0 Hours 20 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

E. Hauge

Signature

Earl Hauge

(Please type or print) Name

SEAL

1130

License #

GROUND WATER

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Permittee: Allied Signal Corporation
Name of Facility: Universal Oil Products
Location: Route 17
East Rutherford, New Jersey
NJPDES Permit No.: NJ Not applicable

ENGINEER'S CERTIFICATION

Well Permit Number (As assigned by NJDEPE's Water Allocation Section (609-984-6831): This number must be permanently affixed to the well casing.	26-31638
Owner's Well Number (As shown on the application or plans):	MW-41
Well completion Date:	11/20/92
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	2.50
Total Depth of Well (one-tenth of a foot):	5.50
Depth to Top of Screen From Top of Casing (one-tenth of a foot):	3.00
Screen Length (feet):	5.0
Screen Slot Size:	10 Slot
Screen Material:	PVC
Casing Material: (PVC, Steel or Other - Specify):	PVC
Casing Diameter (Inches):	4
Static Water Level From Top of Casing at The Time of Certification (one-hundredth of a foot):	0.97
Yield (Gallons per Minute):	0.15
Length of time well pumped or Bailed:	0 Hours 20 Minutes
Lithologic Log:	ATTACH ON BACK

AUTHENTICATION:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

E. Hauge

Signature

Earl Hauge

(Please type or print) Name

SEAL

1130

License #

APPENDIX C

ELEVATION MEASUREMENT TABLES
FORM B, LOCATION CERTIFICATIONS
LEAD (LX)
PCB/PAH (P/P)
VOC (V)
WELLS MW-35 THROUGH MW-41

ALBERT N. FARALDI GROUP, PC

PROFESSIONAL LAND SURVEYORS & PLANNERS
854 EIGHTH STREET, P.O. BOX 1069, SUITE 102
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CLAUDIA B. FARALDI
DIRECTOR OF MANAGEMENT

*MEMBERS OF NEW JERSEY SOCIETY OF PROFESSIONAL LAND SURVEYORS

*AMERICAN CONGRESS ON SURVEYING & MAPPING

*NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS

ELEVATIONS AT LEAD SOIL SAMPLE LOCATIONS (LX)
UNIVERSAL OIL PRODUCTS SITE
EAST RUTHERFORD, BERGEN COUNTY, NEW JERSEY

LEAD SOIL SAMPLE	GROUND ELEVATION	LEAD SOIL SAMPLE	GROUND ELEVATION
LX - 1	4.89	LX - 12	5.51
LX - 2	4.77	LX - 13	5.07
LX - 3	5.21	LX - 14	5.53
LX - 4	4.75	LX - 15	4.69
LX - 5	5.25	LX - 16	5.39
LX - 6	4.64	LX - 17	6.25
LX - 7	5.21	LX - 18	5.09
LX - 8	5.46	LX - 19	5.94
LX - 9	5.57	LX - 20	5.57
LX - 10	5.19	LX - 21	6.25
LX - 11	6.16	LX - 22	Inaccessible

FOR: ENSR CONSULTING & ENGINEERING

NOTE: ELEVATION DATUM IS NEW JERSEY VERTICAL DATUM 1929
BASED ON BENCHMARK E 12 RESET 1957, ELEVATION 94.442'
LOCATED IN CARLSTADT, BERGEN COUNTY, NEW JERSEY

ALBERT N. FARALDI GROUP, PC

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ELEVATIONS AT PCB/PAH SOIL SAMPLE LOCATIONS (P/P)
UNIVERSAL OIL PRODUCTS SITE
EAST RUTHERFORD, BERGEN COUNTY, NEW JERSEY

PCB/PAH SOIL SAMPLE LOCATION	GROUND ELEVATION	PCB/PAH SOIL SAMPLE LOCATION	GROUND ELEVATION
P/P - 1	4.24	P/P - 17	6.00
P/P - 2	4.20	P/P - 18	5.60
P/P - 3	4.32	P/P - 19	4.17
P/P - 4	Not Recovered	P/P - 20	5.89
P/P - 5	4.32	P/P - 21	5.35
P/P - 6	3.90	P/P - 22	3.21
P/P - 7	Not Recovered	P/P - 23	2.93
P/P - 8	4.99	P/P - 24	3.25
P/P - 9	4.96	P/P - 25	3.85
P/P - 10	4.33	P/P - 26	Not Recovered
P/P - 11	5.41	P/P - 27	2.83
P/P - 12	4.95	P/P - 28	2.99
P/P - 13	4.63	P/P - 29	3.21
P/P - 14	6.51	P/P - 30	2.87
P/P - 15	5.53	P/P - 31	2.85
P/P - 16	6.36		

FOR: ENSR CONSULTING & ENGINEERING

NOTE: ELEVATION DATUM IS NEW JERSEY VERTICAL DATUM 1929
BASED ON BENCHMARK E 12 RESET 1957, ELEVATION 94.442'
LOCATED IN CARLSTADT, BERGEN COUNTY, NEW JERSEY

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ELEVATIONS AT MISCELLANEOUS SOIL SAMPLE LOCATIONS (V and S)
UNIVERSAL OIL PRODUCTS SITE
EAST RUTHERFORD, BERGEN COUNTY, NEW JERSEY

SOIL SAMPLE LOCATION	GROUND ELEVATION
S - 4	3.23
S - 5	4.14
V - 1	Not Recovered
V - 2	4.62
V - 3	4.52
V - 4	5.27
V - 5	4.94
V - 6	Not Recovered
V - 7	5.08
V - 8	5.23
V - 9	Not Recovered

FOR: ENSR CONSULTING & ENGINEERING

NOTE: ELEVATION DATUM IS NEW JERSEY VERTICAL DATUM 1929
BASED ON BENCHMARK E 12 RESET 1957, ELEVATION 94.442'
LOCATED IN CARLSTADT, BERGEN COUNTY, NEW JERSEY

ALBERT N. FARALDI GROUP, PC

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* NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS

ELEVATIONS OF MONITORING WELLS DEEP TYPE (D) AND SHALLOW TYPE (S), AND OTHER MISCELLANEOUS WELLS UNIVERSAL OIL PRODUCTS SITE EAST RUTHERFORD, BERGEN COUNTY, NEW JERSEY

MONITORING WELL	TOP OF CASING	TOP OF INSERT	GROUND
MW EAST OF POND	Lock Will Not Open		
MW-3	5.49	No Insert Exists	4.5
MW-WEST OF POND	Lock Will Not Open		6.3
MW 2S	6.74	6.41 (Metal)	3.9
MW 3D	Lock Will Not Open		
MW 3S	6.41	6.35 (Metal)	4.4
MW 7D	7.84	7.71 (Metal)	4.8
MW 7S	Well Is Broken and Bent		4.4
MW 32S	8.67	7.96 (P V C)	4.8
MW 33S	Lock Will Not Open		5.1
MW 34S	Lock Will Not Open		4.7

FOR: ENSR CONSULTING & ENGINEERING

NOTE: ELEVATION DATUM IS NEW JERSEY VERTICAL DATUM 1929
BASED ON BENCHMARK E 12 RESET 1957, ELEVATION 94.442'
LOCATED IN CARLSTADT, BERGEN COUNTY, NEW JERSEY

ALBERT N. FARALDI GROUP, PC

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ELEVATIONS OF MONITORING WELLS
INTERMEDIATE TYPE (I)
UNIVERSAL OIL PRODUCTS SITE
EAST RUTHERFORD, BERGEN COUNTY, NEW JERSEY

MONITORING WELL	TOP OF CASING	TOP OF INSERT	GROUND
MW 2I	7.02	6.92 (Metal)	4.0
MW 3I	7.16	6.46 (Metal)	4.4
MW 4I	7.40	7.21 (Metal)	4.8
MW 5I	6.86	6.58 (Metal)	4.5
MW 6I	7.58	7.21 (Metal)	5.4
MW 7I	7.74	6.49 (Metal)	4.6
MW 8I	Lock Will Not Open		5.0
MW 9I	Not Recovered		
MW 10I	7.53	7.41 (Metal)	4.7
		6.58 (P V C)	
MW 11I	6.32	6.14 (Metal)	4.0
MW 12I	7.32	7.10 (Metal)	4.4
MW 13I	6.32	6.19 (Metal)	4.6
MW 14I	7.18	6.96 (Metal)	4.9

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MONITORING WELL	TOP OF CASING	TOP OF INSERT	GROUND
MW 15I	Not Recovered		
MW 16I	Destroyed		
MW 17I	7.58	7.41 (Metal)	5.6
MW 18I	6.54	6.36 (Metal)	4.8
MW 19I	7.99	7.85 (Metal)	5.3
MW 20I	Lock Will Not Open		6.0
MW 21I	8.29	8.09 (Metal)	5.6
MW 22I	7.05	6.83 (Metal)	5.5
MW 23I	5.98	5.86 (Metal)	4.2
MW 24I	Not Recovered		
MW 25I	Not Recovered		
MW 26I	8.39	8.06 (Metal)	6.5
MW 27I	7.53	7.43 (Metal)	5.4
MW 28I	6.70	6.46 (Metal)	5.1
MW 29I	6.25	5.92 (Metal)	4.4
MW 30I	Lock Will Not Open		6.8
MW 31I	Lock Will Not Open		5.8

FOR: ENSR CONSULTING & ENGINEERING

NOTE: ELEVATION DATUM IS NEW JERSEY VERTICAL DATUM 1929
BASED ON BENCHMARK E 12 RESET 1957, ELEVATION 94.442'
LOCATED IN CARLSTADT, BERGEN COUNTY, NEW JERSEY

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ELEVATIONS OF NEW VOC MONITORING WELLS
UNIVERSAL OIL PRODUCTS SITE
EAST RUTHERFORD, BERGEN COUNTY, NEW JERSEY

MONITORING WELL	TOP OF CASING	TOP OF PVC INSERT	GROUND
MW35	8.27	8.05	5.8
MW36	7.55	7.12	5.1
MW37	8.31	7.79	5.8
MW38	7.66	7.35	5.0
MW39	7.20	6.88	4.4
MW40	7.58	7.37	4.7
MW41	7.52	7.21	4.6

FOR: ENSR CONSULTING & ENGINEERING

NOTE: ELEVATION DATUM IS NEW JERSEY VERTICAL DATUM 1929
BASED ON BENCHMARK E 12 RESET 1957, ELEVATION 94.442'
LOCATED IN CARLSTADT, BERGEN COUNTY, NEW JERSEY

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION-FORM B-LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: UNIVERSAL OIL PRODUCTS, INC.

Location: EAST RUTHERFORD, NEW JERSEY

NJPDES Permit No.: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP'S Water Allocation Section, 609-984-6831): 2 6 - 3 1 6 3 9 - __
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74° - 05' - 20.2"

Latitude (one-tenth of a second): North 40° - 49' - 50.3"

Elevation of Top of Casing, Cap off (one-hundredth of a foot): PVC Insert 8.05
Top of Casing 8.27

Owner's Well Number (As shown on the application or plans): MW 35

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

_____
PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ALBERT N. FARALDI
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ 29346
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to be a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION-FORM B-LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: UNIVERSAL OIL PRODUCTS, INC.

Location: EAST RUTHERFORD, NEW JERSEY

NJPDES Permit No.: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP'S Water Allocation Section, 609-984-6831): 2 6 - 3 1 6 4 0 - __
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74° - 05' - 16.7"

Latitude (one-tenth of a second): North 40° - 49' - 48.4"

Elevation of Top of Casing, Cap off (one-hundredth of a foot): PVC Insert 7.12
Top of Casing 7.55

Owner's Well Number (As shown on the application or plans): MW 36

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

_____
PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ALBERT N. FARALDI
PROFESSIONAL LAND SURVEYOR'S NAME (Please print or type)

SEAL

NJ 29346
PROFESSIONAL LAND SURVEYOR'S LICENSE #

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION-FORM B-LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: UNIVERSAL OIL PRODUCTS, INC.

Location: EAST RUTHERFORD, NEW JERSEY

NJPDES Permit No.: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP'S Water Allocation Section, 609-984-6831): 2 6 - 3 1 6 4 1 - __
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74° - 05' - 21.8"

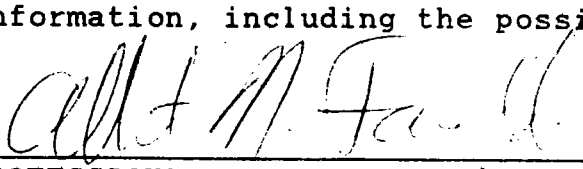
Latitude (one-tenth of a second): North 40° - 49' - 47.8"

Elevation of Top of Casing, Cap off (one-hundredth of a foot): PVC Insert 7.79
Top of Casing 8.31

Owner's Well Number (As shown on the application or plans): MW 37

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ALBERT N. FARALDI
PROFESSIONAL LAND SURVEYOR'S NAME (Please print or type)

SEAL

NJ 29346
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to be a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION-FORM B-LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: UNIVERSAL OIL PRODUCTS, INC.

Location: EAST RUTHERFORD, NEW JERSEY

NJPDES Permit No.: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP'S Water Allocation Section, 609-984-6831): 2 6 - 3 1 6 4 2 - __
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74° - 05' - 21.4"

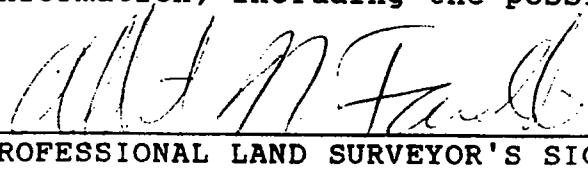
Latitude (one-tenth of a second): North 40° - 49' - 44.6"

Elevation of Top of Casing, Cap off (one-hundredth of a foot): PVC Insert 7.35
Top of Casing 7.66

Owner's Well Number (As shown on the application or plans): MW 38

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ALBERT N. FARALDI
PROFESSIONAL LAND SURVEYOR'S NAME (Please print or type)

SEAL

NJ 29346
PROFESSIONAL LAND SURVEYOR'S LICENSE #

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION-FORM B-LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: **UNIVERSAL OIL PRODUCTS, INC.**

Location: **EAST RUTHERFORD, NEW JERSEY**

NJPDES Permit No.: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP'S Water Allocation Section, 609-984-6831): 2 6 - 3 1 6 3 6 - __
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74° - 05' - 27.1"

Latitude (one-tenth of a second): North 40° - 49' - 48.1"

Elevation of Top of Casing, Cap off (one-hundredth of a foot): PVC Insert 6.88
Top of Casing 7.20

Owner's Well Number (As shown on the application or plans): MW 39

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ALBERT N. FARALDI
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ 29346
PROFESSIONAL LAND SURVEYOR'S LICENSE #

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION-FORM B-LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: UNIVERSAL OIL PRODUCTS, INC.

Location: EAST RUTHERFORD, NEW JERSEY

NJPDES Permit No.: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP'S Water Allocation Section, 609-984-6831): 2 6 - 3 1 6 3 7 - __
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74° - 05' - 27.7"

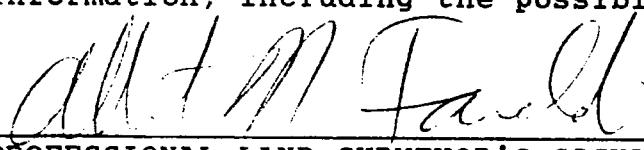
Latitude (one-tenth of a second): North 40° - 49' - 47.7"

Elevation of Top of Casing, Cap off (one-hundredth of a foot): PVC Insert 7.37
Top of Casing 7.58

Owner's Well Number (As shown on the application or plans): MW 40

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ALBERT N. FARALDI
PROFESSIONAL LAND SURVEYOR'S NAME (Please print or type)

SEAL

NJ 29346
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to be a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION-FORM B-LOCATION CERTIFICATION

Name of Permittee: _____

Name of Facility: **UNIVERSAL OIL PRODUCTS, INC.**

Location: **EAST RUTHERFORD, NEW JERSEY**

NJPDES Permit No.: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP'S Water Allocation Section, 609-984-6831): 2 6 - 3 1 6 3 8 - __
This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74° - 05' - 28.5"

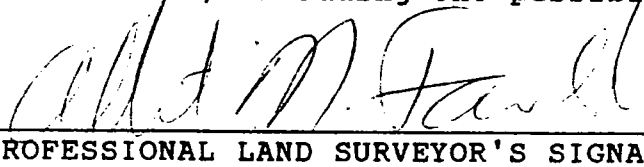
Latitude (one-tenth of a second): North 40° - 49' - 45.1"

Elevation of Top of Casing, Cap off (one-hundredth of a foot): PVC Insert 7.21
Top of Casing 7.52

Owner's Well Number (As shown on the application or plans): MW 41

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ALBERT N. FARALDI
PROFESSIONAL LAND SURVEYOR'S NAME (Please print or type)

SEAL

NJ 29346
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to be a major modification of the NJPDES permit.

APPENDIX D

DATA QUALITY ASSURANCE REVIEW

ENSR
ENSR Consulting and Engineering

MEMORANDUM

TO:	Mike Worthy	**DATE:**	February 1, 1993
FROM:	Marilyn Hoyt	**FILE:**	0186-002-525
RE:	Data Review, UOP Program	**CC:**	

SUMMARY

Data have been reviewed for the analyses of soil and water samples collected during November and December, 1992 at the UOP site in East Rutherford, New Jersey. They were submitted to NET Thorofare Division for analyses in accordance with EPA methodologies for volatile organics, PAH, lead and PCBs. NET also conducted PAH analyses on soil samples following a screening protocol. ENSR performed screening analyses for PCBs and volatile organics on a subset of the samples.

An intermediate level data review was conducted to verify laboratory compliance with method requirements and assess the comparability of analytical data generated in the laboratory following SW-846 methods with that generated by field or laboratory screening techniques. General findings are summarized below:

- Analyses were performed by NET in compliance with method requirements. Results of associated quality control/quality assurance samples demonstrated acceptable precision and accuracy.

- Results for the screening analysis for PCBs, performed by immunoassay techniques, were in agreement with those for the samples analyzed under full EPA protocol.

- Results for the screening analyses of soil and water for volatile organics were in general agreement with one exception. The field GC used was equipped with a detector lamp which was not sensitive to 1,1,2,2-tetrachloroethane. This solvent was a major component in one of the soil and one of the water samples. Field GC results for other components in this soil sample were lower than measured by the laboratory; the field instrument response may have been depressed by the high concentration of the tetrachloroethane, but the tetrachloroethane itself was not detected. Should further field analyses of volatiles be required at the site, the GC should be equipped with a lamp of sufficient energy to permit detection of 1,1,2,2-tetrachloroethane.

- The PAH screen data are qualitatively comparable to the full EPA 8270 data for approximately 65% of the samples. This method has historically achieved agreement of ± 50% Relative Percent Difference for most soils. The UOP site data include a number of samples where the difference between the screen and the full analysis exceeded 100% RPD. In some cases, this can be attributed to measurements made below instrument calibration or differing detection limits for the two analyses, but in several of the samples, no apparent reason for the discrepancy could be identified. Matrix non-homogeneity is a possible cause. The use of the screening method during site remediation should be carefully evaluated in terms of data needs. This data set would indicate that screening data alone for a particular sample should not be used for major decision-making purposes.

SAMPLES

Samples included in these sets are listed below:

November 11: Soil Samples for Volatile Organics Analyses

V-1	V-6	Field Blank
V-2	V-7	Trip Blank
V-3	V-8	
V-4	V-9	
V-5	V-10	

November 18: Soil Samples for Total Lead and TCLP Lead Analyses

LX-1	LX-6
LX-2	LX-7
LX-3 (Broken)	LX-8 (Broken)
LX-4	LX-14
LX-5	LX-30
FB-11-18-92	

November 19: Soil Samples for Total Lead Analyses

LX9	LX-17
LX-10	LX-18
LX-11	LX-19
LX-12	LX-20
LX-13	LX-21
LX-15	LX-22
LX-16	

November 20: Soil Samples for PCBs

PP-1	PP-6
PP-2	PP-7 (Broken in Transit))
PP-3	PP-16 (PAH, PCBs)
PP-4	PP-23 (PAH, PCBs)
PP-5	PP-39
FIELD BLANK (PAH, PCBs)	

November 23: Soil samples for PCBs, PAH, PAH Screen

P/P-8	P/P-13
P/P-9	P/P-14
P/P-10	P/P-15

November 24: Soil Samples for PCBs, PAH, PAH Screen

P/P-11	P/P-25
P/P-12	P/P-27
P/P-17	P/P-28
P/P-19	P/P-29
P/P-24	P/P-30
P/P-18	

November 30: Soil Samples for PCBs, PAH, PAH Screen

S-4A
S-4B
P/P-7
P/P-21
P/P-41 (PCBs only)
P/P-42 (PAH and PAH Screen only)

November 30: Soil Samples for PCBs, PAH, PAH Screen, Total Lead

Lead	PAH, PAH Screen
LX-3	P/P -40
LX-8	
LX-31	

PCBs, PAH, PAH Screen

S-5A
S-5B
P/P-20
P/P-22
P/P-26

December 10: Water Samples for Volatile Organics and Semivolatile Organics

MW-35	MW-41
MW-36	MW-42
MW-37	TRIP BLANK
MW-38	FIELD BLANK
MW-39	
MW-40	

REVIEW ELEMENTS

Sample data have been reviewed for the following parameters:

Agreement of analyses conducted with ENSR requests
Completeness of Deliverables in accordance with ENSR Requirements
Holding times
Detection Limits
Quality Control results for Method Blanks, Matrix Spikes and Matrix Spike Duplicate analyses, Surrogate Recoveries
Chromatograms and Mass Spectra
Sample Calculations
Field Duplicates
Field and Trip Blanks
Comparability between EPA Method Results and Screening Results

DISCUSSION

1. AGREEMENT OF ANALYSES PERFORMED WITH ENSR REQUESTS

Instructions on the Chain of Custody forms submitted to the laboratory indicated that a total of 10 samples from those submitted for PAH analysis should be selected at random for the PAH screening analysis. The laboratory analyzed all samples submitted for full Method 8270 PAH analyses by both 8270 and the screen technique. In addition, some samples submitted for PCB analyses were also analyzed by the PAH screen method. No documentation is included to indicate that ENSR authorized the PAH screen analyses for all samples. Other analyses conducted were in accordance with ENSR requests.

The PAH screen analysis as performed by NET provides results in totals for two PAH groupings. Included in the backup data report are results for each individual PAH. ENSR extracted data from these for the individual PAH of particular interest to this program.

2. COMPLETENESS OF DELIVERABLES

Deliverables provided for the volatile and semivolatile organics analyses included all raw data associated with the analyses of calibration standards, quality control samples and field samples. Deliverables provided for the PCB analyses included copies of the chromatograms but not the integration tables used for quantification. Deliverables provided for the metals analyses included instrument print-outs for all analyses, but not complete prep records.

3. HOLDING TIMES

All samples were prepared and analyzed by NET within the holding times specified by the applicable method. Due to instrumentation failure, the water samples analyzed by ENSR using the field GC technique were analyzed after the holding times had expired. Results, however, do not appear to be biased by this exceedance; field GC and laboratory results are comparable for most measurements and those differences noted are not consistently higher by either technique.

4. DETECTION LIMITS

The screening techniques and the laboratory methods used have different detection limits. The detection limits for the volatile GC screen are typically higher than the laboratory method by factors of 10 to 100, so that low levels of components noted in the laboratory may not be found by the screen technique. In contrast, the PAH screen is more sensitive to PAH than the EPA method by a factor of 10. For several samples, detection limits for the PAH full analysis were additionally elevated due to dilutions required to minimize matrix interferences. This difference in detection limits contributed to the variances in total PAH noted for several samples analyzed by both techniques.

5. QUALITY CONTROL RESULTS

5.1 Method Blanks

Method blanks for analyses performed met method requirements.

5.2 Matrix Spike/Matrix Spike Duplicate Analyses

Recoveries for matrix spike and matrix spike duplicate analyses were generally within method control limits for accuracy and precision.

5.3 Surrogate Recoveries

Surrogate recoveries for the full PAH analyses were within control limits for all samples. Surrogate recovery control limits for PCB analyses are advisory; although some recoveries fell somewhat outside of these, no data qualifications were applied to program data.

6. CHROMATOGRAMS AND MASS SPECTRA

Chromatograms and mass spectra were visually inspected to verify the identifications of target analytes. No discrepancies were noted.

7. SAMPLE CALCULATIONS

Calculations were spot-checked for all analytical parameters except PCBs. No errors were detected. PCB data deliverables did not include those area measurements upon which Aroclor concentrations were based.

8. FIELD BLANKS

Field and trip blanks were free of significant contamination by target analytes.

9. FIELD DUPLICATES

Field duplicates were submitted for all analytical categories. Results of these are summarized below. Variability in the volatiles measurements likely reflect the inherent difficulties in collecting and analyzing soil with high concentrations of volatiles; target analytes are readily lost during sample transfer in the field and in the laboratory. Variability in the PCB analysis indicates non-homogeneity of the contamination in the soil.

PAH Analyses, mg/kg

	Method 8270	PAH Screen
P/P-40	ND	ND
P/P-22	ND	ND
P/P-42	ND	ND
S-4B	ND(<3.2)	0.2

PCB Analysis

P/P-3	75000 ug/kg Aroclor 1248
P/P-39	9100 ug/kg Aroclor 1248

Lead Analysis, mg/kg

LX-30	730
Lx-3	480

Volatile Organics Analyses, ug.kg

	1,2-Dichlorobenzene	1,1,2,2-Tetrachloroethane	Trichloroethene
V-10	450000	12000000	630000
V-5	400000	6400000	300000

10. DATA COMPARABILITY - FIELD AND LABORATORY ANALYSES

10.1 PCB Analyses

PCB analyses with the ENSYS Field Kit demonstrated excellent agreement with EPA Method 8080 results. The ENSYS kit uses immunoassay techniques to demonstrate PCB content less than or greater than a selected action level. Screen analyses were conducted to cover the range from less than 2ppm, between 2 and 25 ppm and greater than 25 ppm. One sample measured by the screen technique registered 2 ppm, while the full lab analysis reported < 0.2 ppm. All other measurements agreed on the range of sample concentration.

10.2 Volatile Organics Analyses

Volatile organics measurements by the field GC and laboratory technique generally agreed, with the exception noted above for 1,1,2,2-tetrachloroethane which could not be detected by the field GC instrumentation. Soil samples V-4 and V-7 measured significantly higher for benzene and toluene by the field technique. A variety of factors could contribute to the discrepancy. Previous EPA studies have demonstrated that soil samples may suffer significant losses of volatiles in the collection porcess and in the laboratory when an aliqout is taken for analysis. In addition, if any soil particulates are not completely removed from the threads of the vial prior to capping, losses during transport and storage may be excessive. It is not unusual for field analyses, which are less susceptible to bias from losses, to measure significantly higher volatile organics concentrations than the laboratory analyses. Also of particular note for these samples is their high moisture content. Data are reported on a dry weight basis; all volatiles present are ascribed to the solids portion of the sample. In actuality, the groundwater associated with the soil likely contains high concentrations of the organics. If the laboratory and field samples contain different amounts of water, the final results may differ as a result. In general, EPA guidleines for data interpretation and usage recommend that measurements for samples with high moisture content be considered as estimated. This applies to laboratory as well as field measurements. Results for the field analysis of V-5 were significantly lower than the laboratory analysis; this is the sample with the high 1,1,2,2-tetrachloroethane concentration. It is likely that its presence could have depressed instrument response to other target analytes.

The volatile organics headspace analyses of the water samples generally agreed well. Measurements significantly below the calibration range for the field instrument demonstrated good agreement with the laboratory results. Variability between the two techniques was greatest for the one sample, MW-37, with high parts per million concentrations of several analytes.

10.3 PAH Analyses

A total of 31 samples were analyzed by the two techniques for PAH measurement. Data compared generally well for 20 of these, with differences greater than a factor of 5 times for the remaining 11 samples. Neither technique was consistently higher in concentration measured, and no pattern could be discerned for the differences. Apparent concentration range, bias for one technique over another, moisture content or actual PAH components present did not appear related to the discrepancies. This percentage of significant differences is greater than typical for the two methods. Caution should therefore be used in applying the screening technique to this site.

APPENDIX E

REVISED DEPE SOIL CLEANUP STANDARDS, JANUARY 19, 1993

c: Mike Worthy

State of New Jersey
Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
CN 028
Trenton, NJ 08625-0028

Scott A. Weiner
Commissioner

Karl J. Delaney
Director

Mr. Mark Kamilow
Manager, Site Remediation
Allied-Signal Inc.
P.O. Box 1139
Morristown, NJ 07962-1139

FEB 4 1993

Dear Mark:

Re: Soil Cleanup Criteria

As you probably are aware, the Department did not adopt the February 3, 1992 cleanup standards rule proposal. Enclosed for your use is a table that contains the Department's soil cleanup criteria. If you have any questions concerning the use of this table or implications this may have concerning the program at UOP, please call me at (609) 633-1455.

Sincerely,

Joseph Freudenberg, Case Manager
Bureau of Federal Case Management

c. Mike Worthy, ENSR

RPCE\BFCM\UOP043.JBF

SOIL CLEANUP CRITERIA (mg/kg)

This listing represents the combination of Tables 3-1 and 7-1 from the Department of Environmental Protection and Energy's February 3, 1992 proposed rule entitled Cleanup Standards for Contaminated Sites, N.J.A.C. 7:26D, with noted corrections based upon errors identified to the Department during the comment period as well as new toxicological information obtained since the rule proposal. Please refer to the respective footnotes for more detail. Notwithstanding, where the following criteria are based on human health impacts, the Department shall still consider environmental impacts when establishing site specific cleanup criteria. This along with other site specific factors including background conditions may result in site specific cleanup criteria which differ from the criteria listed below. Therefore, this list shall not be assumed to represent approval by the Department of any remedial action or to represent the Department's opinion that a site requires remediation.

Note: Material bracketed [thus] is deleted and material underlined thus is added

Contaminant	CASRN	Residential Direct Contact Soil Cleanup Criteria(a)(b)	Non Residential Direct Contact Soil Cleanup Criteria(a)(b)	Impact to Ground water Soil Cleanup Criteria(b)
Acenaphthene	83-32-9	3400	10000(c)	100
Acetone	67-64-1	1000(d)	1000(d)	50
Acrylonitrile	107-13-1	1	5	100
Aldrin	309-00-2	0.040	0.17 ~~0.49~~	50
Anthracene	120-12-7	10000(c)	10000(c)	500
Antimony	7440-36-0	14	340	
Arsenic [(Total)]	7440-38-2	[20](e) 2(f)	[20](e) 2(f)	
Barium	7440-39-3	[600] 700(g)	[26000] 47000(g)(s)	
Benzene	71-43-2	3	13	1
3,4-Benzofluoranthene (Benzo(b)fluoranthene)	205-99-2	[0.66] 0.9(g)	[2.5] 4(g)	500
Benzo(a)anthracene	56-55-3	[0.66] 0.9(g)	[2.5] 4(g)	500
Benzo(a)pyrene (BaP)	50-32-8	0.66(f)	0.66(f)	100
Benzo(k)fluoranthene	207-08-9	[0.66] 0.9(g)	[2.5] 4(g)	500
[Benzo(ghi)perylene]	[191-24-2]	[0.66](h)	[2.5](h)	500
Benzyl Alcohol	100-51-6	10000(c)	10000(c)	50
Beryllium	7440-41-7	[2](e) 1(f)	[2](e) 1(f)	
Bis(2-chloroethyl) ether	111-44-4	[1] 0.66(f)(i)	3	1
Bis(2-chloroisopropyl) ether	39638-32-9	2300	10000(c)	10
Bis(2-ethylhexyl) phthalate	117-81-7	49	210	100
Bromodichloromethane (Dichlorobromomethane)	75-27-4	5	22	1
Bromoform	75-25-2	86	370	1

Bromomethane	74-83-9	[790] 79(i)	1000(d)	1
2-Butanone (MEK)	78-93-3	1000(d)	1000(d)	50
Butylbenzyl phthalate[s](j)	85-68-7	[10000](j) 1100	10000(c)	100
Cadmium	7440-43-9	1	100	
Carbon tetrachloride	56-23-5	2(k)	4(k)	1
4-Chloroaniline	**106-47-8**	**230**(l)	**4200**(l)	
Chlorobenzene	108-90-7	37	[690] 680(i)	1
Chloroform	67-66-3	19(k)	28(k)	1
4-Chloro-3-methyl phenol (p-Chloro-m-cresol)	59-50-7	10000(c)	10000(c)	100
Chloromethane	74-87-3	520	1000(d)	10
2-Chlorophenol	95-57-8	280	5200	50
Chrysene	218-01-9	[0.66] 9(g)	[2.5] 40(g)	500
Copper	7440-50-8	600(m)	600(m)	
Cyanide	57-12-5	[280] 1100(g)	[5200] 21000(g)(t)	
4,4'-DDD (p,p'-TDE)	72-54-8	3	12	100
4,4'-DDE	72-55-9	2	9	100
4,4'-DDT	50-29-3	2	9	100
Dibenz(a,h)anthracene	53-70-3	0.66(f)	0.66(f)	500
Dibromochloromethane (Chlorodibromomethane)	124-48-1	110	1000(d)	1
Di-n-butyl phthalate	84-74-2	5700	10000(c)	100
Di-n-octyl phthalate	117-84-0	1100	10000(c)	100
1,2-Dichlorobenzene	95-50-1	5100	10000(c)	50
1,3-Dichlorobenzene	541-73-1	5100	10000(c)	100
1,4-Dichlorobenzene	106-46-7	[280](j) 570	[1200](j) 10000(c)	100
3,3'-Dichlorobenzidine	91-94-1	2	[7] 6(i)	100
1,1-Dichloroethane	75-34-3	[1000] 570(i)	1000(d)	1
1,2-Dichloroethane	107-06-2	6	24	1
1,1-Dichloroethene	75-35-4	[51](j) 8	[940](j) 150	10
1,2-Dichloroethene (trans)	156-60-5	[960] 1000(d)(i)	[10000](j) 1000(d)	50
1,2-Dichloroethene (cis)	156-59-2	79	[1500](n) 1000(d)	50
2,4-Dichlorophenol	120-83-2	170	[5200](j) 3100	10
1,2-Dichloropropane	**78-87-5**	**10**(l)	**43**(l)	
1,3-Dichloropropene (cis and trans)	542-75-6	4	5(k)	1
Dieldrin	60-57-1	0.042	0.18	50
Diethyl phthalate	84-66-2	10000(c)	10000(c)	50
2,4-Dimethyl phenol	105-67-9	1100	10000(c)	10
Dimethyl phthalate	131-11-3	10000(c)	10000(c)	50
2,4-Dinitrophenol	51-28-5	110	2100	10
[2,4-Dinitrotoluene]	[121-14-2]	[1](o)	[4](o)	10
Endosulfan	115-29-7	3	52	50
Endrin	72-20-8	17	310	50
Ethylbenzene	100-41-4	1000(d)	1000(d)	100
Fluoranthene	206-44-0	2300	10000(c)	500

Fluorene	86-73-7	2300	10000(c)	100
[Fluoride]	[16984-48-8]	[1100](p)	[10000](p)	
Heptachlor	76-44-8	0.15	0.65	500
Hexachlorobenzene	118-74-1	[0.42](n) 0.66(f)	2	50
Hexachlorobutadiene	87-68-3	11	210	50
Hexachlorocyclopentadiene	77-47-4	400	7300	100
Hexachloroethane	67-72-1	[1700](j) 6	[10000](j) 100	100
Indeno(1,2,3-cd)pyrene	193-39-5	[0.66] 0.9(g)	[2.5] 4(g)	500
Isophorone	78-59-1	1100	10000(c)	10
Lead [(Total)]	7439-92-1	100	600	
Lindane	58-89-9	0.52	2.2	1
2-Methylphenol	**95-48-7**	**2800**(l)(i)	**10000**(l)(c)	
4-Methylphenol	**106-44-5**	**2800**(l)(i)	**10000**(l)(c)	
Methoxychlor	72-43-5	280	5200	500
Mercury [(Total)]	7439-97-6	14	[260] 270(i)	
4-Methyl-2-pentanone(MIBK)	108-10-1	1000(d)	1000(d)	50
Methylene chloride	75-09-2	49	[170] 210(i)	10
[Napthalene](j) **Naphthalene**	91-20-3	230	4200	100
Nickel [(Soluble salts)]	7440-02-0	250	2400(k)	
Nitrobenzene	98-95-3	[1] 28(q)	520	50
N-Nitrosodiphenylamine	86-30-6	140	[590] 600(i)	100
N-Nitrosodi-n-propylamine	621-64-7	0.66(f)	0.66(f)	1
PCBs (Polychlorinated biphenyls)	1336-36-3	[0.45](i) 0.49	2	100
Pentachlorophenol	87-86-5	[1700](j) 6	[10000](j) 24	100
Phenol	103-95-2	10000(c)	10000(c)	50
Pyrene	129-00-0	1700	10000(c)	500
Selenium [(Total)]	7782-49-2	[1] 63(g)	[1000] 3100(g)(s)	
Silver	7440-22-4	[40] 110(g)	[2000] 4100(g)(s)	
Styrene	100-42-5	23	97	100
1,1,1,2-Tetrachloroethane	630-20-6	[260] 170(g)	[440] 310(g)	1
1,1,2,2-Tetrachloroethane	79-34-5	34	70(k)	1
Tetrachloroethylene	127-18-4	[9] 4(r)	[37] 6(r)	1
Thallium	7440-28-0	2(f)	2(f)	
Toluene	108-88-3	1000(d)	1000(d)	500
Toxaphene	8001-35-2	[0.62] 0.10(r)	[2.7] 0.2(r)	100
1,2,4-Trichlorobenzene	120-82-1	[1100] 68(g)	[10000] 1200(g)	100
1,1,1-Trichloroethane	71-53-6	210	[3800](n) 1000(d)	50
1,1,2-Trichloroethane	79-00-5	[23] 22(i)	420	1
Trichloroethene (TCE)	79-01-6	23	[100] 54(r)	1
2,4,5-Trichlorophenol	95-95-4	5600	10000(c)	50
2,4,6-Trichlorophenol	88-06-2	62	[260] 270(i)	50
Vanadium	7440-62-2	[380] 370(i)	[7000] 7100(i)(s)	
Vinyl chloride	75-01-4	2	7	1

Xylenes (Total)	1330-29-7	[360] <u>410</u>(i)	[6300](n) <u>1000</u>(d)	10
Zinc	7440-66-6	1500(m)	1500(m)	

(a) criteria are health based using an incidental ingestion exposure pathway except where noted below
(b) criteria are subject to change based on site specific factors (e.g., aquifer classification, soil type, natural background, environmental impacts, etc.)
(c) health based criterion exceeds the 10000 mg/kg maximum for total organic contaminants
(d) health based criterion exceeds the 1000 mg/kg maximum for total volatile organic contaminants
(e) cleanup standard proposal was based on natural background
(f) health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
(g) criterion has been recalculated based on new toxicological data
(h) proposed standard is withdrawn as there is no published slope factor or RfD for this compound
(i) original criterion was incorrectly calculated; new criterion recalculated using original toxicological data
(j) typographical error
(k) criterion based on inhalation exposure pathway which yielded a more stringent criterion than the incidental ingestion exposure pathway
(l) criterion derived in the basis and background document but inadvertently omitted from Table 3-1 for the residential standard and Table 7-1 for the non-residential standard as found in the proposed rule
(m) criterion based on ecological (phytotoxicity) effects
(n) health based criterion
(o) proposed standard is withdrawn as there is no current published carcinogenic classification or slope factor
(p) proposed standard is withdrawn pending further evaluation
(q) proposed standard was based on inhalation exposure pathway using incorrect toxicological information. Recalculation using the correct toxicological information renders incidental ingestion as the more stringent exposure pathway.
(r) criterion based on incidental ingestion exposure pathway was inadvertently proposed in lieu of criterion based on inhalation exposure pathway which yielded a more stringent criterion
(s) level of the human health based criterion is such that evaluation for potential environmental impacts on a site by site basis is recommended
(t) level of the criterion is such that evalutaion for potential acute exposure hazard is recommended

FOR: ENSR CONSULTING & ENGINEERING

SURVEYED LOCATIONS OF MONITORING WELLS, LEAD SOIL SAMPLE LOCATIONS, PCB/PAH SOIL SAMPLE LOCATIONS, SOIL SAMPLE LOCATIONS V and S, AND CONCRETE PADS, UNIVERSAL OIL PRODUCTS SITE, BOROUGH OF EAST RUTHERFORD, BERGEN COUNTY, NEW JERSEY.

DATE: DEC. '92/JAN '93
SCALE: 1" = 60'
DRAWN BY: J. J. D.

ALBERT N. FARALDI GROUP, PC
PROFESSIONAL LAND SURVEYORS & PLANNERS
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ENSR Consulting and Engineering

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Connecticut	Hartford	(203) 657-8910
Illinois	Chicago	(708) 887-1700
Massachusetts	Boston	(508) 635-9500
Minnesota	Minneapolis	(612) 924-0117
New Jersey	Mahwah	(201) 818-0900
	Mt. Laurel	(609) 234-5520
	Somerset	(908) 560-7323
North Carolina	Raleigh	(919) 571-0669
Pennsylvania	Pittsburgh	(412) 261-2910
South Carolina	Rock Hill	(803) 329-9690
Texas	Dallas	(214) 960-6855
	Houston	(713) 520-9900
Washington	Seattle	(206) 881-7700
Puerto Rico	San Juan	(809) 753-9509